GOVERNMENT OF MYSORE.

PUBLIC WORKS DEPARTMENT.

MYSORE-MADRAS ARBITRATION.

ENQUIRY INTO THE QUESTION OF STORAGE OF THE CAUVERY WATERS WITHIN MYSORE TERRITORY.

VOL. II.

SELECT EXHIBITS FROM THE MYSORE AND THE MADRAS CASES FILED BEFORE THE ARBITRATION COMMITTEE.

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SELECT EXHIBITS FROM THE MYSORE AND THE MADRAS CASES FILED BEFORE THE ARBITRATION COMMITTEE.—*contd.*

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CONTENTS.

		Page.
Exhibit Ma. 1.	—Statement of case put in by Madras	1
„ Ma. 1-a.	—Accompaniment to Ma. 1—Provisional rules defining the method of passing down supplies required for irrigation in the Madras Presidency	2
„ Ma. 1-b.	—Telegram from the Secretary to the Government of India, Public Works Department, to the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch) ...	3
„ Ma. 1-c.	—Note regarding conditions of Arbitration put in by Madras ...	3
„ Ma. 1-d.	—Note, dated 21st July 1913, by the Madras Representative ...	4
„ My. 1.	—Statement of case put in by Mysore	7
„ My. 1-a.	—Terms of reference to the Committee of Arbitration by Mysore ...	15
„ My. 2.	—Provisional rules for working the Mysore Reservoir	19
„ My. 2-a.	—Mysore version copy of rules and Agreement of 1892 defining the limits within which no new irrigation works are to be constructed by Mysore without previous reference to Madras ...	20
„ My. 2-b.	—Supplemental note by the Mysore Representative to the provisional rules	30
„ Ma. 2.	—Madras version copy of rules and Agreement of 1892	31
„ Ma. 3.	—Madras reply to Mysore case presented on 21st July 1913 including reply to the Mysore provisional rules for working the Mysore Reservoir	39
„ Ma. 3-b.	—Note by the Madras Representative regarding settlement of issues before the Mysore Rejoinder	47
„ My. 4.	—Mysore Rejoinder to Madras Reply dated 29th July 1913 ...	49
„ Ma. 4.	—Madras Rejoinder to the Rejoinder presented by Mysore on 4th August 1913	71
„ Ma. 5.	—Suggested Terms of Reference by the Madras Government ...	75
„ Ma. 6.	—Protest by Madras regarding information required of Mysore ...	77
„ Ma. 6-a.	—Letter, dated 9th September 1913, from the Joint Secretary to Government, Public Works Department, Madras, to M. Nethersole, Esq., Inspector-General of Irrigation, Simla	80
„ Ma. 6-b.	—Letter, dated 16th September 1913, from M. Nethersole, Esq., Inspector-General of Irrigation and Assessor, Mysore-Madras Arbitration, to the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch)	81
„ Ma. 6-c.	—Note by the Assessor on the protest put in by Madras in Ma. 6 ...	81
„ Ma. 6-d.	—Enquiry by the Madras Representative with reference to the Assessor's reply (Ma. 6-c)	82
„ Ma. 6-e.	—Assessor's reply to the enquiry made by the Madras Representative	82
„ Ma. 7.	—Part I, Madras case—Legal arguments, first and second issues ...	83
„ Ma. 8.	—Part II, Madras case—Historical and Descriptive	97
„ Ma. 9.	—Part III, Madras case—Engineering arguments, second issue ...	115
„ Ma. 10.	—Part IV, Madras case—Engineering arguments, third issue ...	131
„ Ma. 8-a.	—Madras G. O. No. 292-I., dated 18th September 1911 ...	157
„ Ma. 9-a.	—Note regarding population affected by irrigation below the Upper Anicut	226
Appendix I.	—Rules of regulation of the Upper Anicut, Lower Anicut and Grand Anicut	227
„ II.	—Table showing occasions of carrying water in the Cauvery and the Vennar at depths exceeding full supply stated in the rules ...	235

		Page.
Appendix III.—	List of channels taking off from the Cauvery between the Upper Anicut and the Bhavani and areas irrigated	240
„ IV.—	Statement of water levels, Veeranam tank, 1890 to 1909 ...	241
„ V.—	Diagram showing area charged as irrigated in the Cauvery Delta and the Lower Coleroon Anicut systems	
„ VII.—	Provisional rules defining the method of passing down supplies required for irrigation in the Madras Presidency	243
„ IX.—	Note by Col. Ellis on computation of discharges at Sivasamudram ...	244
„ X.—	Table of discharges of the Cauvery by float observations at Danakere and corresponding discharges at Sivasamudram, Bhavani bridge and Upper Anicut	246
Exhibit My. 6.—	Statement of Mysore case with special reference to Madras case presented on 21st October 1913	247
„ My. 7.—	Part II, Mysore case (Prescriptive rights)	253
„ My. 8.—	Part III, Mysore case (Place and mode of measurement) ...	267
Appendix A.—	Sir K. Seshadri Iyer's letter and memorandum of June 1890 ...	275
„ B.—	Rules for regulation of water at the Upper Anicut	283
„ C.—	Rules for regulation at Cauvery-Vennar regulators	284
„ D.—	Table of discharges in mills. cubic feet in the month of June for years 1890-1909	285
„ E.—	Provisional rules for working the Mysore Reservoir	286
„ F.—	Statement showing areas irrigated as compared with supplies (*a*) due to 7 ft. limit discharges, (*b*) supplies actually used, and (*c*) supplies that would be available with the limits proposed by Mysore for twenty years ending 1909-10...	288
„ G.—	Tables showing quantities of flow that would have been available from Madras irrigation with the limits proposed by Mysore as compared with the quantities due to a uniform limit of 6 ft. for twenty years ending 1909-10	289
„ H.—	Tentative rules for making allowance for rainfall	294
„ K.—	Statement of discharges in the Coleroon showing the quantities used for irrigation of the Lower Anicut system	295
„ L.—	Abstract of Appendix IV of the Madras case	299
„ M.—	Discharges of the river Bhavani at the Kodiveru Anicut, the Amaravati at Pallipalayam and the Noyel at Chitrachavadi Anicut ...	300
„ N.—	Madras Table N improved	305
„ P.—	Working Tables I, II and III	325
Exhibit Ma. 11.—	Madras Rejoinder, Part V, Legal arguments	365
Appendix A.—	Notes of the Conference held at Ootacamund on 10th May 1890, to consider pending irrigation disputes between Madras and Mysore	369
Exhibit Ma. 12.—	Madras Rejoinder, Part VI, Facts and Engineering arguments, second issue	391
Appendix XV.—	Statement showing the area of irrigation under the Cauvery and its tributaries above the Upper Anicut for each period of five years commencing from 1890	415
„ XVI.—	Letter, dated 18th September 1911, from the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch), to Sir J. Benton, K.C.I.E., Inspector-General of Irrigation	417
„ XVII.—	Comparative statement of annual discharges of the Cauvery and the Vennar in millions of cubic feet, June to January ...	417
„ XVIII.—	Table showing occasions of carrying water in the Cauvery and the Vennar at depths exceeding full supply stated in the rules of regulation in force	418
Exhibit Ma. 13.—	Madras Rejoinder, Part VII, Facts and Engineering arguments, third issue	423
Appendix XX.—	Extract from the "Madras Mail," dated 19th May 1913, *re* the Cauvery Reservoir	431

1
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Exhibit Ma. I.

Statement of case put in by Madras.

I. The Government of Madras refused to assent to the project for the larger reservoir proposed by Mysore chiefly on the ground that the proposals did not provide to any adequate degree for passing down to Madras the water for Madras irrigation to which Madras is entitled by prescriptive right already acquired and actually existing. Further, Mysore have failed to afford to Madras any statement of the discharges past the dam site on which they base their water-supply computations, and, in the absence of such statement with full details as to the data on which the discharges are based, Madras is unable fully to investigate the proposals or realise fully to what extent the proposals are calculated to affect Madras irrigation.

II. The proposals put forward by Madras are that the regulation of water in the working of Mysore Reservoir must be such as to give to Madras the whole flow of the river up to the quantities specified below:—

(*a*) A discharge equivalent to the normal discharge due to a depth of 7 feet of water passing over the Cauvery dam at the Upper Anicut.

(*b*) This discharge is to be measured on the Cauvery and its tributaries immediately above the waterspread of Kannambadi Reservoir and at a station on the Kabbini river about 40 miles above its junction with the Cauvery.

(*c*) A right to call for an additional quantity of water not exceeding 350 million cubic feet daily subject to a maximum in any one year of 4,900 million cubic feet. (This claim is based on existing practice in past years)

(*d*) During the south-west monsoon (June to September) an additional 66 million cubic feet daily for the supply of Veeranam tank.

(*e*) During the south-west monsoon an allowance of 25 *per cent* on the flow in Mysore to be made to provide for losses in transmission between Sivasamudram * and the Upper Anicut.

* "Mysore" in original. Amended in the course of Proceedings of the 19th July with permission.

III. The rules proposed by Mysore in connection with the working of Mysore Project with a view to giving to Madras the supply to which there exists prescriptive right are noted below:—

(1) with the project as originally sent in with a request for assent of Madras, no rules of regulation were furnished.

(2) Provisional rules for the working of the smaller reservoir (Enclosure to Dewan's No. 11-Camp of 10th May 1912).

(3) Rules proposed by the Dewan at a Conference held at Ootacamund on 30th May 1913.

As regards (1), no remarks are called for.

As regards (2), the examination into the working of these rules showed that not only did they altogether fail to secure to Madras the supplies of water to which prescriptive right exists, but they were also unfavourable to Mysore necessitating passing from Mysore Resesvoir water much of which would be inevitably wasted into the sea.

As regards (3), in the absence of statements of daily discharges past the dam site which Mysore have failed to furnish, it is impossible to make an accurate examination of the effect of working of these rules on Madras water-supplies. An examination was, however, made making certain assumptions and using the best figures of discharges available.

2

The result of such examination showed that, under the rules put forward, the supplies which would be delivered at the Upper Anicut did not amount in quantity to what under existing prescriptive right Madras is entitled. In addition to this it was found that under the proposed system of regulation the daily discharges at the Upper Anicut would be made to fluctuate much more than they do under existing conditions, and this would render regulation more difficult and reduce efficiency and duty of water.

The results of the above examinations were communicated to Mysore with the intimation that the Government of Madras were unable for the reasons given to assent to the system of regulation proposed.

W. M. ELLIS, COL., R.E.,
Representative of the Madras Government.

Exhibit Ma. I-a.

Accompaniment to Paragraph III (2) and (3) of the Statement of case put in by Madras.

MYSORE CAUVERY RESERVOIR PROJECT.

(*i*) *Provisional rules defining the method of passing down supplies required for irrigation in the Madras Presidency.*

[*Enclosure to Dewan's letter No. 11-Camp of 10th May 1912.*]

The total flow in the river up to a limit of 26,700 cusecs as measured at the Cauvery dam across the Aganda Cauvery shall be considered as the supply required for irrigation in the Madras Presidency during the irrigation season, *viz.*, from 1st June to 31st January.

2. Any flow in the river in excess of this limit of 26,700 cusecs shall be considered as available for storage in Mysore.

3. From 1st March to 31st May the entire flow in the river shall be available for impounding within Mysore limits.

4. For purposes of calculation, the total river discharge at the Cauvery dam on any day shall be taken as the actual flow at the Cauvery dam on that day *plus* the quantity impounded in the Mysore Reservoir four days previously. Necessary deductions should be made from this quantity for supplies passed down from the Mysore Cauvery Reservoir four days previously, for adjusting any excess storage in that reservoir.

5. All excess water impounded in the reservoir above the quantity determined by rules 2 and 4 shall be passed down into the river from day to day.

6. The gauge at each station, that is, the Mysore Cauvery Reservoir and the Cauvery dam (Upper Anicut), shall be observed twice a day, namely, at 6 A.M. and 6 P.M., and the average taken as the mean rate of discharge for the day.

7. A register of gauge discharges shall be maintained on a printed form for each station.

8. Copies of the record of observations at the Mysore Cauvery Reservoir dam shall be forwaded from day to day to the Madras Government; similarly, the daily observations at the Bhavani bridge and the Cauvery dam (Upper Anicut) shall be forwarded from day to day to the officer in charge of the Cauvery Reservoir. From the day the reservoir comes into operation, the daily discharges at the Cauvery dam and the Bhavani bridge shall be communicated by telegram to the officer in charge of that reservoir. The charges in this connection shall be borne by the Mysore Durbar.

9. These rules shall be subject to reconsideration by mutual consent between the two Governments at the end of three years from the date the Mysore Cauvery Reservoir comes into operation.

(*ii*) *Rules proposed by the Dewan of Mysore at a Conference held at Ootacamund on the* 30*th May* 1913.

I. There shall be no impounding on any day at Kannambadi until the supply at Sivasamudram exceeds 12,000 cusecs.

II. The daily discharges at the Upper Anicut shall be telegraphed to Kannambadi and Sivasamudram.

III. The daily discharge at the Upper Anicut, *plus* the quantity (if any) impounded at Kannambadi three days previously shall be taken as representing the correct discharge at the Upper Anicut, *i.e.*, what would have been the discharge if there had been no impounding at Kannambadi.

IV. If the quantity reckoned under rule III is less than 2,300 million cubic feet in 24 hours, the whole of the quantity stored shall be sent down from Kannambadi on the same day, unless the Madras authorities desire otherwise and it is possible to hold the water up longer in the Kannambadi Reservoir.

V. Any surplus water held up at Kannambadi by the request of the Madras Government, which they do not require on the day that it is due, shall be at their call for a period of seven days.

VI. When the Madras Government consider that they can with safety spare water below 7 feet at the Upper Anicut, they will permit Mysore to impound.

VII. Gauges shall be established before the confluence of the more important tributaries *en route* and observations shall be telegraphed daily, so that an indication may be afforded to the officer at Kannambadi of the amount which he is likely to be permitted to impound.

Exhibit Ma. I-b.

Telegram from the Secretary to the Government of India, Public Works Department, to the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch), dated Simla, the 5th July 1913, No. 981-I.

Your telegram 4 of third. Precise terms of reference will be settled by Arbitration Committee on spot. Nethersole reaches Ootacamund 15th instant.

Exhibit Ma. I-c.

Conditions of Arbitration.

I am instructed by my Government to strongly protest against the conditions under which the enquiry is to be carried on as defined in the Dewan's letter of 17th July to the Arbitrator.

One of the conditions of arbitration agreed upon by each side was to have a representative (an Engineer appointed by his Government) to put forward the case on behalf of that Government.

It is submitted that, under the conditions proposed by Mysore, these conditions are not fulfilled and the Mysore Government is only represented by written statements signed by a Secretary to that Government.

The Chief Engineer, Mysore, is not a representative of his Government but merely a technical explainor, and even in this capacity his Government are empowered under the terms to repudiate his explanation or any admission he may make. Under such conditions it will be necessary to ask for adjournment of the

sitting for confirmation by Government of every important explanation, justification or admission given.

Under such conditions a representative is almost useless and it is clear why Mysore did not send one.

It is submitted that the intention of the Government of India is that the Engineer representative shall be a "real representative" and that his statement, written or oral, shall be binding on his Government.

When the representative is in doubt as to the views of his Government, it is open to him to ask for time to ascertain these, but to carry on an enquiry in which every statement, oral or written, of the representatives on both sides may be repudiated involves interminable delay and will protract proceedings unduly.

I am, however, instructed that, if it is decided that the conditions enunciated by the Dewan are approved by the Arbitrator, the same conditions shall be accepted as applying to the Representative of the Madras Government.

W. M. ELLIS, COL., R.E.,

21*st July* 1913. *Representative of the Madras Government.*

Exhibit Ma. I-d.

I have received instructions from my Government to submit that this Government have put in a brief statement of their claims as regards water-supply and justification of their refusal to assent to the construction of the Mysore larger project.

It is on account of failure to come to terms on these matters that this Arbitration Court is appointed.

I am instructed with all respect to submit that, before proceeding further, Madras are entitled to claim from Mysore :—

First, a reply to Madras statement already put in saying how much of the claim advanced it admits.

Second, a clear statement of the rules of regulation which Mysore now propose as suitable for satisfying the admitted rights of Madras as regards water-supply.

In this connection it is useless to say that they consider the water should be measured at the Upper Anicut, as the dam must be the place of final issue and regulation, and Mysore must, it is submitted, state clearly by what means they propose to effect such regulation. Two sets of rules have already been advanced by Mysore to both of which Madras take exception and refuse assent. These are attached to the Madras statement of the case. This Government claim to know which of these sets of rules is now advanced by Mysore or in alternative what new proposals are put forward. Until this is known, a detailed statement of Madras objections to the Mysore project cannot be formulated and no further advance can be made. The proposed terms of reference made by Mysore further indicates that their case is to be based on an interpretation of the Agreement of 1892 that the rights of Madras therein mentioned are those actually in existence when the agreement was entered into.

The interpretation put on the agreement by Madras is that the rights alluded to are those actually in existence at the time when sanction to the proposed work was asked for, and this has been intimated to Mysore.

If Mysore claims a different interpretation, it is claimed that this should be clearly stated in the statement of the Mysore case.

I am further instructed to claim the right of rejoinder after the Mysore statement of case is put in. Madras are now in ignorance of what Mysore claims: they have refused assent to the project as advanced by Mysore and the proposed rules of regulation advanced by them, and hitherto all considerations and arguments

used have been based on existing rights and not on rights existing when the agreement was come to.

Should new proposals be put forward by Mysore or a new reading of the meaning of the agreement, it will be clear that the Madras statement of the case put in as a rejoinder to the new claim put forward by Mysore may take the form of an alternative statement of our demands.

Under instructions from my Government I therefore claim the right, after seeing Mysore claims, to put in a fresh statement of the case.

I am instructed to respectfully ask that after this stage the issues should be framed, after which it will be for Madras or Mysore to open the argumentative aspect of their case and produce evidence and arguments in support of the claims which they have advanced.

W. M. ELLIS, COL., R.E.,

21st July 1913. *Representative of the Madras Government.*

ENQUIRY INTO THE QUESTION OF STORAGE OF THE CAUVERY WATERS WITHIN MYSORE TERRITORY.

Statement of case for Mysore for the consideration of the COMMITTEE OF ARBITRATION appointed by the Government of India. July 1913.

1. Preliminary.

The present understanding between the Madras and Mysore Governments in regard to the use of the waters of the Cauvery river is based on the agreement of 1892, which provides that Mysore may build storage reservoirs on condition that the prescriptive rights of Madras to the water supply for their irrigation, already acquired and actually existing, are not interfered with. In 1910, the Mysore Durbar proposed to start the construction of a reservoir of a capacity of 41,500 million cubic feet. The project was objected to by the Madras Government at first but, eventually, after reference to the Government of India, permission was accorded to build a reservoir capable of storing about 11,000 million cubic feet. As the Mysore Government were pressed for a decision on account of the demand for power supply from the Kolar Gold Fields, they provisionally accepted the conditions laid down by Madras. But they stated that negotiations in connection with the larger reservoir would be renewed as they felt sure that sanction to the same would not be refused when the full case was submitted to the Government of India. They have accordingly commenced the construction of the reservoir with the wider foundations necessary for the full storage of 41,500 million cubic feet.

2. The question of regulating the river flow to meet the requirements of Madras irrigation has been under consideration and discussion between the two Governments from November 1910, and two distinct proposals were suggested by the Mysore Durbar for provisional adoption. But the Madras Government have not agreed to either and have preferred to resort to arbitration.

2. Prescriptive Rights of Madras.

3. The agreement of 1892 provides that the Madras Government "shall be bound not to refuse their consent" for the construction of any new reservoir "except for the protection of the prescriptive right, already acquired and actually existing, the existence, extent and nature of such right, and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case."

The Madras Government is accordingly entitled to water supply for irrigation acquired by prescriptive right.

4. As this dispute began in 1910 and as 20 years' peaceful enjoyment is necessary for the acquisition of a prescriptive right, Madras is entitled under the agreement to a supply of water to the area irrigated, and the quantity of water actually used, about the year 1890.

In order to determine the prescriptive right of Madras, it is therefore necessary that detailed maps and statements should be prepared showing the actual extent of irrigation practised, say, three years before, and three years after, 1890. They will give a correct idea of the actual extent of the prescriptive right of Madras. This is the first question that will require the consideration of the Arbitration Committee.

3. Requirements of Madras Irrigation.

5. The Madras Government contend that, in the exercise of their prescriptive right, they are entitled to utilise for their own use the entire river flow up to a depth of 7 feet on the Cauvery dam between the months of June and February, *i.e.*, for nine months in the year.

6. There are serious objections to granting this demand. In the first place, a depth of 7 feet was never reached in the first fortnight of June except on one occasion during the past twenty years. In the months of November and December, that depth was rarely ever reached. In January and February, the limit was never reached except for two days in twenty years. There is therefore no sort of justification for a claim for 7 feet depth for five months out of nine.

7. Besides, in judging the quantities due, we have to be guided by the supply actually used about the year 1890 as explained above.

It would appear from the following extract taken from pages 3 and 4 of Volume I of the Madras Project that facilities for forcing an extra depth of one foot were obtained by the remodelling of the regulator at the Upper Anicut between the years 1899 and 1902 :—

"*Latest improvements.*—The question of water distribution and flood control has of late received great attention. Several new regulators of a modern and powerful type have been built. The Upper Anicut was cut down and rebuilt in 1899 to 1902 as an open dam with 55 vents, 40 feet wide, fitted with lifting gates which allow a much freer passage for flood water while enabling an extra one foot of depth to be forced into the Cauvery. The Lower Anicut has also been converted into an open dam with 60 iron gates, each measuring 34 feet × 6 feet, and it is now capable of heading up water, when necessary, to a level of 2 feet higher than before conversion."

This shows that till about 1899, the discharge passed down for irrigation was not 7 feet but somewhat less. There seems to be no justification to claim 7 feet under these circumstances.

8. The average fortnightly depths of water actually passed down for irrigation vary in different months of the year from 2·5 feet to 6·6 feet. In some months, it has never gone beyond 3 or 4 feet. For such months, a claim of 7 feet depth is altogether untenable.

The maximum during the same period never exceeded the limit of 7 feet except in July and August ; *vide* columns 2 and 3 in the following table.

Months	Average depths corresponding to average fortnightly discharge	Average depths corresponding to maximum fortnightly discharge	Average depths now proposed by Madras in connection with their new project
1	2	3	4
	Feet	Feet	Feet
June ... 1st half	3·5	5·4	2·9
2nd half	5·1	6·4	2·9
July ... 1st half	5·7	7·0	6·1
2nd half	6·4	7·0	6·1
August ... 1st half	6·6	8·0	5·9
2nd half	6·0	7·0	5·9
September ... 1st half	5·6	6·7	5·8
2nd half	5·2	6·4	4·7
October ... 1st half	5·4	6·9	5·0
2nd half	5·4	6·6	4·2
November ... 1st half	5·0	6·6	3·8
2nd half	4·4	6·5	3·8
December ... 1st half	3·9	6·4	3·0
2nd half	3·0	5·1	1·7
January ... 1st half	2·5	4·6	2·1

9. A larger depth may be allowed in the season of maximum demand, but in June, when irrigation is just starting or in September to February when the crops are being harvested or the natural flow of the river itself is low, the higher depth claimed is inadmissible.

Besides, allowance should be made for occasions when, on account of heavy local rainfall or storms in the delta, no supply is required in the canal. This factor has been taken into consideration by the Madras Engineers in the case of their Metur Project; *vide* paragraph 62, Vol. I, page 17.

10. In proof of the soundness of these contentions, it may be observed that, in the Metur Reservoir Project of the Madras Government, the depths allowed for existing irrigation from fortnight to fortnight are all lower than 6·1 feet, being based on the actual flow of the past 20 years; *vide* column 4 of the table in paragraph 8 above.

This shows that a modification is necessary in the depth of 7 feet claimed. The depths should not be uniform in all the 9 months. It is admitted that some allowance should be made on account of the uncertain flow of the river. An addition of about 25 to 30 per cent to the supplies provided in the Metur Project should be sufficient as against the uniform depth of 7 feet claimed. The limitation only applies to the supply from the catchment above Kannambadi as supplies from 22,072 out of 26,172 square miles of catchment will be arriving unchecked even after the construction of the Mysore Reservoir.

11. Further, a claim is advanced to an extra supply for the Coleroon irrigation. This is untenable because it is admitted in the Madras records that, under the present conditions, the Coleroon system is maintained from the leakage and waste from the delta irrigation without any special allowance from the river. Similarly, in the Metur Project, where lower depths are allowed for irrigation, no separate allowance is made for supply to the Coleroon system.

The following extract from page 2 of Volume I of the Metur Project will show why this is so:—

"The actual method by which the supplies to the area under this anicut, that is, the flow in the Coleroon, below the Grand Anicut, is fed is not clearly traceable. The system of regulation in force at the Upper and Grand Anicuts only provides for passing surplus water into the Coleroon and thus the flow in this river, except in flood time, is derived from leakage through the Upper and Grand Anicuts and other surplus works, drainage from wet cultivation, leakage and percolation from the marginal lands in which the water level is, in the irrigation season, higher than the ordinary flow level in the Coleroon. It is found, as a fact, that although no definite supply through works is being passed to the Coleroon, there is always an adequate supply in that river for the Lower Anicut system when the supplies in the Cauvery system are adequate. It is convenient to add here that allowance in the working tables of the new reservoir has been made for the area under the Lower Coleroon Anicut system as well as for that under Cauvery Delta system, and the area of 'existing irrigation in the delta,' constantly referred to in the report, includes the area under both the systems."

12. In one of their latest communications, a claim is also put forward by the Madras Government for the replenishment of a tank known as Veeranam tank. This tank seems to have its own independent catchment and is also included in Coleroon irrigation, for which no special provision is made in the Madras Project.

In the same communication, a right to claim an additional supply for thirty days in any year has also been advanced. This is said to be based on the practice of recent years, that is, since the remodelling of the Upper Anicut in the year 1902. Any practice of such recent origin will not constitute a prescriptive right.

These two claims have been put forward by Madras for the first time in a letter so recent as 11th June last.

13. It is therefore clear that a more equitable arrangement would be to fix the depths of supply due at the Cauvery dam separately for each fortnight or month, with due regard to the average depths actually utilised in the past as well as to those provided for in the Madras Irrigation Project.

10

This is the second important question requiring the special consideration of the Arbitration Committee.

4. Place of Measurement of Supply due to Madras.

14. The Madras Government have all along contended that the measurement of the supply due to them at the Cauvery dam should be actually given at the Sivasamudram Anicut or some other higher point including a special allowance for losses in transmission.

The only place, where the water used for the bulk of the irrigation in the Madras Presidency is fairly accurately gauged, is the Cauvery dam at the head of the delta. The flood discharges have also been properly measured here for a long time past.

The other two places where observations have been made are the Bhavani Bridge, 75 miles above the Cauvery dam and Sivasamudram, 190 miles above the same point.

The observations at the Bhavani Bridge do not appear to be correct because in the Madras Cauvery Reservoir Project the maximum allowance made for waste weir discharge is only 250,000 cusecs. The proper allowance seems to be 50 to 75 per cent more than what has been assumed. This shows that the gauging at the Bhavani Bridge cannot be satisfactory. Also, discharges below 1,125 cusecs have not been gauged at all.

The Sivasamudram gauge was intended to measure only low discharges needed for purposes of power generation. For gauging high floods, the site is unsuitable and the past records of gauge readings are not reliable. These considerations show that, both for reasons of accuracy and for proximity to the bulk of the irrigated area, the Cauvery Dam is the most suitable site at which to take measurements for the purpose of regulating the river supply.

15. The Madras Government have also advanced a claim to an addition of 10 per cent to the discharges due to them at the Cauvery Dam, if the measurements were given at the Sivasamudram gauge. Since the actual depths at the Cauvery Dam represent the net supply after allowing for losses in transmission and needs of irrigation in the upper reaches, no such allowance is necessary if the measurements are taken at the dam itself. Even otherwise, the claim is untenable because the credit due to the additions to the river flow between Sivasamudram and the Cauvery Dam is not a negligible quantity.

5. System of Regulation.

16. We know, roughly at least, what discharge Madras was getting from the Cauvery Dam 20 years before these negotiations began in 1910 and to which, as already stated, the Madras Government is now entitled. Those figures, when correctly ascertained, will also show to what extent Mysore is entitled to store.

No reservoir, however small, can be constructed which will not altogether interfere with the natural flow of the river.

The problem is to devise a "fair and reasonable" method by which, while allowing Madras irrigation its prescriptive supply, Mysore might not be prevented from impounding the surplus.

The mere fact of interference with the natural river flow cannot be considered a sufficient bar against reservoir construction in Mysore.

17. Another point which has to be considered in this connection is that it takes one to four or five days, depending upon the magnitude of the flood, for water to flow from the Kannambadi reservoir to the Cauvery Dam at the head of the delta. In order to be able to store in Mysore all the water in excess of that to be given for irrigation at the Cauvery Dam, the river supply has to be intercepted nearer the source one to five days earlier. It is difficult under these circumstances to determine the quantity to be impounded at the Kannambadi reservoir on any particular day. So, the impounding will have to be done under some system more or less conventional or arbitrary. In devising a system, it must be remembered that once the waters leave the site of the dam, they cannot be recalled, whereas, any excess storage impounded by miscalculation could be restored to the river and made

available for irrigation in the next two or three days. A mistake or miscalculation in the one case means only postponement of supply by two or three days, whereas in the other, the entire excess supply is permanently lost and may be eventually wasted into the sea.

18. Since these negotiations began, the Mysore Government have suggested two methods of regulation. One is referred to in the Madras Government's letter No. R. O. C. 968-11-1, dated the 23rd November 1911, and the other in their letter R. O. C. No. 106-0—13–5, dated the 17th June 1913, to the address of the Hon'ble the Resident.

These proposals were put forward tentatively for adoption for a period of six years. Neither of these methods was proposed for permanent adoption without further test. They were both intended to be provisional till the needful correct data were collected. It may be observed that a further examination of the second proposal shews that the limit of discharge of 12,000 cusecs at Sivasamudram, proposed to be allowed to flow before any impounding is permitted at Kannambadi, would be unfavourable to Mysore. If the second proposal is accepted, the limit must be lowered and fixed separately for each fortnight. Subsequent examination of the gauge records at Sivasamudram has shewn that the discharges there are overestimated.

19. The Madras Government have throughout assumed that it will take four days for the floods to flow from Kannambadi to Cauvery Dam. This period means that the velocity of flow will be always 3¾ feet per second. But it will be readily admitted that during floods, particularly when the flood depth at Cauvery Dam is 6 or 7 feet or more, the river velocity may be 5 to 10 feet per second. Taking a mean of, say, 7 feet, the average period of flow between the Kannambadi Reservoir and Cauvery Dam—a distance of 250 miles—will be two days. So the period will vary according to the intensity of flood. It will be nearer the truth to assume two days instead of four.

The heaviest rainfall months are July and August and, with simultaneous rainfall along the river, the local rainfall near Cauvery Dam will produce floods there even earlier than the Kannambadi water could do so. All this will have to be allowed for in any final settlement.

20. If the discharges are correctly measured for five or six years with a view to collect the data required for this particular problem, it would be easy to determine the time the Kannambadi supply will take to travel to the Cauvery Dam under any particular conditions. No insuperable difficulties therefore exist in calculating and allowing for the time required for water to flow from Kannambadi to the Cauvery Dam.

6. Proposed Regulation to be Tentative.

21. Any arrangements now arrived at should be tentative.

The gaugings taken in the past have had no reference to the special requirements of the regulation now found necessary.

Any rules which may now be framed, on the basis of such imperfect data as we have at present, will be defective.

If any errors creep into the rules, they may seriously prejudice one side or the other.

It is suggested therefore, that whatever rules are decided on now may be tested for a period of at least 6 years before the arrangement is confirmed. In the meantime, the gauging should be perfected and special arrangements should be made for observing the river discharges at three or four intervening points at frequent intervals, daily or even hourly, when necessary. Such a system of regulation has been suggested by the Madras Engineers in connection with their Metur project. (*Vide* para 62, Vol. I of Madras Cauvery Reservoir Project).

22. A few years' observation like this will enable the officer at Kannambadi to estimate the correct quantity to be impounded to a nicety. The same observations will eventually enable the two Governments to frame more accurate and acceptable rules for impounding in Mysore.

7. No Outside Interference with Distribution of Water.

23. The agreement of 1892 gives Mysore the freedom to utilise whatever supply is not required for Madras to satisfy actual existing prescriptive rights. This freedom exists as indubitably as the claim of Madras to demand the supply required for irrigation, for which it has a prescriptive right. Having allowed for this, there should be no interference with the internal distribution of water in Mysore territory and there is no necessity either.

If there are to be any restrictions, it is only fair they should apply to both parties.

8. Supply due to Mysore.

24. The area irrigated in Mysore at present is about 110,000 acres, of which 40,000 come below the site of the Kannambadi reservoir.

The area actually irrigated in Madras at present under the Cauvery and its tributaries is 1,225,500 acres. The irrigation in Mysore is therefore only about 8 per cent of the whole.

This is the first time that Mysore has attempted to make a substantial addition to its slender irrigation facilities by means of river storage.

It is roughly computed that the average total quantity of water which passes through Mysore territory, as measured at Sivasamudram, is 330,000 million c.ft. This amounts to as much as three-fourths of the total yield of the catchment above the Cauvery Dam at the Upper Anicut.

If the present arrangements continue, Mysore will be held tied down, while Madras can go on extending its already disproportionately large irrigation. Madras can go on building reservoirs and, what is most detrimental to Mysore, accumulating further and new prescriptive rights of irrigation.

9. Creation of New Prescriptive Rights Undesirable.

25. The agreement of 1892 was one-sided because it tied the hands of the Durbar in the matter of irrigation extensions in Mysore without any *quid pro quo*. No corresponding restrictions of a material character were imposed on the liberty of Madras to extend their irrigation. Nor did it impose any reasonable obligations on the part of Madras to respect the rights of Mysore. The provisions of the proposed agreement were contested by the Mysore Durbar but were finally acquiesced in.

On that occasion the Madras Government wrote to the Government of India in the following terms:—

"I am therefore to solicit the interference of the Government of India in bringing such pressure to bear on the Durbar as will secure the interests of Madras."

26. If Madras constructs a reservoir, the restrictions now sought to be imposed should be relaxed in favour of Mysore.

Also, should Madras extend irrigation in future, Mysore should not be made to submit to any further restrictions arising from rights to be acquired in future on that account without its previous consent.

It is therefore necessary that Mysore should be furnished with correct maps and statements of any future extensions that may be contemplated.

10. Other Points for Consideration.

27. The principal question for consideration is how to regulate the river flow so as not to interfere with the existing rights of Madras to a "tangible and material" extent, without at the same time imposing harassing and unjust restrictions as regards storage in Mysore.

28. The reason why the point of gauging should not be changed from Cauvery dam has already been explained in paragraph 14 above.

We have reason to think that the insistence of the Madras Government to have the gauging stations transferred to Mysore Territory, *viz.*, to Sivasamudram (a point 190 miles above where it is due) or according to their latest demand 250 miles above the same point, arises from their anxiety to provide for storage for their proposed Metur reservoir.

29. Even after the completion of the reservoir the measurement may continue at the Cauvery dam, due allowance being made for the quantities daily impounded in, and issued from, the Metur reservoir. Only, the rules now framed will have to be modified in favour of Mysore by a reduction of the depths due at the Cauvery dam.

30. Mysore cannot agree to measurements at Sivasamudram, because the Durbar will then be deprived of the storage due to a catchment of nearly 17,000 square miles, of which 5,000 is in Mysore territory itself. Some consideration may be given also to the fact that Madras should not be allowed to use water wastefully, while Mysore is arranging to store and use the same economically. There can be no prescriptive right to wasteful use. The floods in the month of June are mostly allowed to flow into the sea (*vide* paragraph 82, page 187, Volume I of Madras Cauvery Reservoir Project).

31. Whatever regulation is decided on, no restrictions should be allowed which are based merely on the results of years of extremely unfavorable rainfall, for then, Mysore would be deprived of the use of the full advantage of the river. If calculations are based on the yield of the worst years only, few irrigation projects would be practicable in any part of India, including the Metur project. It is necessary that Mysore should not be prevented from building new reservoirs in the Cauvery basin in Mysore Territory for the extension of its irrigation.

32. Mysore should be given due credit for the increase in the cold weather flow, due to the stored water constantly given out for power generation. This will enable the Madras cultivators along the river banks to utilise the water for perennial crops like sugar-cane. Eventually, the discharge will be 1,000 cusecs or more, sufficient to irrigate about 60,000 acres and to give a revenue of perhaps 4 to 6 lakhs of rupees annually, without any expenditure for storing water on the part of the Madras Government.

11. Terms of Reference and Conclusion.

33. The considerations, set forth above, have led the Mysore Government to propose the terms of reference included in the printed note, already forwarded to the Committee of Arbitration through the Hon'ble the Resident.

34. It only remains to be stated here that, while objecting to the construction by the Mysore Durbar of a reservoir of 37,000 million cubic feet net capacity, the Madras Government have themselves proposed to construct a reservoir of more than double that capacity, just beyond the borders of Mysore. The construction of such a reservoir would have been justifiable if it had been solely intended to protect existing irrigation. But the Madras Government propose an extension of their present irrigation by about 355,000 acres, while objecting to an extension of less than 150,000 acres in Mysore.

35. From the commencement of these negotiations, the Mysore Government have willingly furnished all available information and arguments in support of their case, whereas according to their own recent statement (*vide* Madras Government letter R. O. C. No. 106-0—13-1, dated the 11th June 1913, to the address of the Government of India) "the reasons for which the Madras Government have felt unable to assent to the construction of the Mysore reservoir have not as yet been fully set forth." This statement has, therefore, had to be prepared without a full knowledge of the Madras view of the case.

KARPUR SHRINIVASRAV,
Offg. Secy. to the Govt. of Mysore,
Public Works Department.

Bangalore,
17th July 1913.

Karnataka State Archives,
(Departmental Library)
Accession No. (B)014536
Date

15

Exhibit My. I-a.

Terms of reference to the Committee of Arbitration on the question of the utilisation of the Cauvery Waters in connection with the Kannambadi Reservoir.

On June 18th, the Resident informed the Durbar that, in the event of arbitration, the Government of India suggested the following terms of reference to the Arbitrators:—

"(*a*) Whether, in view of the rules published with the Madras Government's G. O. No. 162-I, dated the 18th February 1893, the Mysore Government are entitled to impound any part of the waters of the Cauvery over and above the amount agreed to in para 2 of the Madras Government's letter to the Resident in Mysore, dated the 23rd September 1911.

"(*b*) If so, what proportion of the available supply is the Mysore State entitled to impound and on what conditions?"

The Resident had been requested to report whether the Durbar and the Madras Government accepted these terms.

2. The Durbar considered that the terms needed some revision. There was no question of the division of surplus waters; and the arrangement made by the Madras letter of 23rd September 1911 was provisional. Looking to the Agreement of 1892, the Durbar suggested that the terms of reference might be:—

"(i) What is the quantity of water required for the protection of the Madras Government's prescriptive rights, as already acquired and actually existing when the Agreement of 1892 was made?

"(ii) How the flow should be measured and regulated in order to secure the performance of their obligations by the Durbar?

"(iii) In what manner can the protection of the Madras Government's prescriptive rights be secured with the least injury to Mysore?"

The Resident communicated the views and suggestions of the Durbar to the Government of Madras in a letter No. C. 88, dated the 27th June 1913.

3. The position at this time was that certain proposals made by the Dewan at a meeting held at Ootacamund on 30th May 1913 were under consideration. The Resident informed the Madras Government un-officially on 27th June that the Durbar, after examining the Madras reply to these proposals, were of opinion that an agreement without arbitration might be reached, but were content to leave it to the Madras Government to decide whether recourse should or should not be had to arbitration.

4. On the 1st July, the Madras Government telegraphed that they were unable to accept the Dewan's proposals and preferred a reference to arbitration, adding that they understood Sir H. Griffin could commence proceedings on the 16th July.

5. On the 2nd July, the Resident, after consulting the Durbar, telegraphed to the Madras Government and the Government of India that, subject to agreement as to the terms of reference, the Durbar would be prepared for arbitration on the 16th July, on the lines of the Dewan's letter 609, dated 22nd January 1913, and the Resident's letter C. 26, dated 1st May, as indicated in the telegram from the Foreign Department 1301—I.B., dated June 3rd.

6. On the 4th July, the Resident received and communicated to the Durbar a telegram from the Madras Government, repeating the following terms which had been suggested to the Government of India:—

"(i) What is the quantity of water to which Madras is entitled for requirements of existing irrigation both above and below Upper Anikat and which

should during the different months of the year be passed down by Mysore before impounding at Kannambadi Reservoir?

"(ii) In what manner and at what point of the river should measurement be made of the discharge which is to be passed down before the Mysore Government begins to impound?

"(iii) Does the decision of the foregoing points justify the refusal of the Madras Government to assent to the construction of the reservoir as projected by the Durbar?"

The telegram added: "Proposal in item (i) of terms proposed by Mysore in Resident's letter C. 88 of 27th June, limiting our rights to those existing at the time of the Agreement of 1892 is an unwarrantable addition to the Agreement of 1892, and proposal in item (3) is objectionable as it is not for the Arbitrators to find best means for Mysore to utilize water available. Proposed terms cannot therefore be accepted."

While the Madras suggestions were under consideration, the Resident informed the Durbar that he had received on 6th July a telegram from the Government of India stating that the precise terms of reference would be settled by the Arbitration Committee on the spot.

7. The Durbar find themselves unable entirely to accept the terms proposed by the Madras Government (para 6 above) for the following reasons:—

In the first term—

(*a*) the word "existing" appears to the Durbar to be too wide. They consider that the Madras Government are only entitled to such rights as are given to them by the Agreement of 1892.

(*b*) The words "before impounding at Kannambadi" seem to be superfluous. Provided the rights of Madras are protected, the point at which the Durbar may impound is a subsidiary detail.

(*c*) For the same reason, the words "before the Mysore Government begins to impound," in the second term, appear to be superfluous, unless the expression is more clearly defined.

(*d*) The 3rd term proposed by Madras seems to be superfluous, as the answers to the two preceding terms would settle the point.

8. The Durbar do not at present understand the objections taken by the Madras Government (para 4 above) to the terms which the Durbar proposed.

(*a*) The prescriptive right of the Madras Government must, as it seems to the Durbar, be decided by the Agreement of 1892, and this view appears to be substantiated by the remarks contained in para 23 of Sir J. Benton's Note of the 12th May 1911, in (i) and (ii) of the sub-paras which commence with the words "(i) The agreement is dated 18th February 1892."

(*b*) The Madras Government state that item 3 of the Durbar's proposed terms is objectionable "as it is not for the Arbitrators to find the best means for Mysore to utilize water available." The 3rd term proposed by the Durbar was:—"In what manner can the protection of the Madras Government's prescriptive rights be secured with the least injury to Mysore?" It seems to the Durbar that this suggestion was in accord with the final sentence of Rule III of the Agreement of 1892.

9. After further consideration, the Durbar now suggest that the terms of reference might be as in the attached draft.

10. The Durbar request that the Resident will kindly communicate copies of this note, with the attached draft, simultaneously to Sir H. Griffin, the Madras Government, and the Government of India. The Durbar are prepared, should Sir H. Griffin so desire, to depute an officer to Ootacamund to give any further information which may be required of their views as to the terms of reference.

BANGALORE,
12th July 1913.

KARPUR SHRINIVASRAV,
Offg. Secretary to the Govt. of Mysore,
Public Works Department.

Terms of reference now proposed.

1. What is the quantity of water required during the different months of the irrigation season for the protection of the Madras Government's prescriptive right already acquired and actually existing on the basis of the Agreement of 1892?
2. In what "fair and reasonable manner," according to the same agreement, should the supply due to Madras be regulated and measured in order to protect the prescriptive rights of Madras while at the same time serving the Kannambadi reservoir, in the first stage, for the construction of which the consent of the Madras Government has been obtained?
3. Any reservoir constructed according to Rule III of the Agreement of 1892 must interfere with the natural flow of the river to some extent, small or large. May not, principles of regulation and measurement similar to those to be resorted to in the case of the smaller Kannambadi Reservoir, be adopted with suitable modifications, if necessary, in connection with the larger reservoir also?
4. Whether, in view of the fact that recorded measurements are not reliable as admitted by both parties, a term of years may not be fixed for the experimental working of any system of measurement and regulation that may now be decided upon?
5. What are the difficulties likely to arise in future between the two Governments either in connection with the measurements and regulation of water, or the development of irrigation in either territory, and what precautionary rules are necessary, in addition to the Agreement of 1892, to provide against future difficulties and disagreements of this character?

Exhibit My. 2.

As the Arbitration Committee has decided that rules for working the large Mysore Reservoir should be supplied, I have obtained permission to submit a set of provisional rules accordingly.

I am to add that the rules will require modification if the depths of water, assumed in Rule 1 as due to Madras at the Upper Anicut, are found to be overstated, when the prescriptive right comes to be settled by the Committee.

FERN HILL,
Dated 26th July 1913.

KARPUR SHRINIVASRAV,
Offg. Secy. to the Govt. of Mysore, P. W. D.

Enclosure.

Provisional Rules for working the Mysore Reservoir.

The total flow in the river, up to the limits mentioned in the following table, shall be considered as the supply at the Cauvery dam across the Aganda Cauvery to which Madras is entitled during the irrigation season from 1st June to 31st January by prescriptive right according to Rule III of the Agreement of 1892:—

		Proposed depths in feet	Daily discharge. Million cubic feet.
June	1st half	3·5	450
	2nd half	5·1	1,060
July	1st half	6·9	2,230
	2nd half	6·7	2,090
August	1st half	6·6	2,020
	2nd half	6·6	2,020
September	1st half	6·2	1,755
	2nd half	5·2	1,120
October	1st half	5·4	1,240
	2nd half	5·4	1,240
November	1st half	5·0	1,000
	2nd half	4·4	696
December	1st half	3·9	538
	2nd half	3·0	370
January		2·5	290

2. Any flow in the river at the Upper Anicut in excess of the above limits shall be considered as available for storage in Mysore, that is, in the Kannambadi Reservoir.

3. From 1st February to 31st May the entire flow in the river shall be available for impounding within Mysore limits.

4. The supplies due to Madras from day to day shall be calculated from the actual discharge in the river determined in the following manner:—

(*a*) The total river discharge at the Cauvery dam, on any day in the second half of June and in July, August and September, shall be taken as the sum of the actual flow at the Cauvery dam on that day and the quantity of river water impounded at the Kannambadi Reservoir two days previously.

(*b*) During the remaining months of the irrigation season, the discharge at the Cauvery dam shall be computed in a similar way, but with an interval of three days instead of two.

(*c*) Necessary deductions shall be made in the quantity of discharges arrived at as above, for supplies passed down from the Mysore Reservoir two or three days (as the case may be) previously, for necessary adjustment of any excess storage in that Reservoir as provided in Rule 5 below.

5. All excess quantity of water impounded in the reservoir beyond the amount permitted by Rule 2, shall be passed down into the river from day to day.

6. The gauges at the Cauvery dam and the reservoir shall ordinarily be read at least twice a day at 6 A.M. and 6 P.M., but during floods they shall be read every hour or at other intervals as may be required by Mysore, and the information communicated by telegram. The average daily discharge shall be calculated from such readings so as to give the closest approximation to actual discharge.

7. Gauges shall also be established at the stations named below :—

Within Mysore Territory.

(*a*) Hullhalli Anicut across the Kabbini.

(*b*) Kalhalli Anicut across the Hemavati.

(*c*) Chamaraj Anicut across the Cauvery.

(*d*) Ayerhalli Anicut on the Lakshmanathirtha.

(*e*) Meke Datu on the Cauvery below the junction of the Arkavati.

Within Madras Territory.

(*f*) A station on the Cauvery below the junction of the Bhavani.

(*g*) Do at a station below the junction of the Noyel and the Amaravati.

8. The gauge-readings at the stations mentioned in Rule 7 shall be telegraphed to the Officer at Kannambadi daily at suitable intervals to enable him to estimate, as nearly as possible, the correct quantity to be stored on any day, and impound accordingly.

9. The charges incurred in this connection by the Madras Government shall be borne by the Mysore Durbar.

10. Copies of the above gauge-readings shall be supplied to the Officer at the Cauvery dam.

11. The Officer in charge of the Cauvery dam shall have instructions to telegraph to the Officer in charge of the Kannambadi Reservoir, whenever, on account of rain in the delta or other reason, the entire flow in the river may be impounded in the reservoir.

12. Rule 4 above, fixing two and three days respectively in certain months as the interval required for water to travel from Kannambadi to Cauvery dam, shall be subject to revision, by mutual agreement between the two Governments, at the end of six years counting from the date the Mysore Reservoir comes into operation.

FERN HILL,
Dated 26th July 1913.

KARPUR SHRINIVASRAV,
Offg. Secy. to the Govt. of Mysore, P. W. D.

Exhibit My. 2-a.

From Colonel C. Bowen, R.E., Secretary to the Government of Mysore, Public Works Department, to the Assistant to the Resident, dated 4th January 1892, No. 3—1.

With his letter No. 1-A of 10th June 1890, the Dewan submitted to the Resident a Memorandum on the subject of the restoration and construction of Irrigation works in Mysore, the right to effect which without restriction had been disputed by the Madras Government. In that letter he urged the Resident to represent the matter in full to the Government of India in view to a settlement of the points at issue.

2. Colonel Sir Oliver St. John informed the Dewan in April last that the Government of India would prefer the matter to be settled, if possible, by some understanding between Madras and Mysore; and before leaving Ootacamund this year he

arranged for a conference between the officers of the two Governments. Under such circumstances, the Durbar again made endeavours in conference with the Madras Government to arrive at an amicable understanding regarding our future irrigation operations, so that controversy might be obviated in regard of individual works, and a sphere of operations declared in which Mysore projects should be absolutely untrammelled; at the same time, restrictions to be accepted by the Durbar, on certain classes of works on certain rivers and in certain valleys which might affect prejudicially Madras works beyond the frontier.

3. The rules and schedules which I now forward embody the arrangements which have been come to in an informal manner, by personal discussion, or by demi-official communications, and I am desired to request you will be good enough to move the Resident to now obtain from the Government of Madras their *formal* acceptance of the same. They will then be adopted by Mysore for future guidance of the Irrigation officers.

4. Annexed to the final rules and schedules is printed the demi-official correspondence which led to the modification of the rules after they were first framed and discussed at Ootacamund in May last. These letters will show that the general terms of the settlement have, with an exception, been informally agreed to by both Governments.

5. The exception I allude to is that referred to in the secondary clause to rule V. The decision of the Government of India will be necessary on that point, *viz.*, the existence of a liability on the part of Mysore on account of three large reservoirs now actually under construction, and if such liability exists, the extent of it; but the definite acceptance by Madras of the rules and schedules as now drawn up is desirable before the controverted cases are specially referred.

———

Rules defining the limits within which no new irrigation works are to be constructed by the Mysore State without previous reference to the Madras Government.

I. In these rules,

(1) "*New Irrigation Reservoirs*" shall mean and include such irrigation reservoirs, or tanks, as have not before existed, or having once existed, have been abandoned and been in disuse for more than thirty years past.

(2) A "New Irrigation Reservoir" fed by an anicut across a stream shall be regarded as a "*New Irrigation Reservoir across*" *that stream.*

(3) "Repair of Irrigation Reservoirs" shall include (*a*) increase of the level of waste weirs and other improvements of existing irrigation reservoirs or tanks, provided that either the quantity of water to be impounded, or the area to be irrigated, is not more than the quantity previously impounded, or the area previously irrigated, by them; and (*b*) the substitution of a new irrigation reservoir for and in supersession of an existing irrigation reservoir but in a different situation, or for and in supersession of a group of existing irrigation reservoirs, provided that the new work either impounds not more than the total quantity of water previously impounded by the superseded works, or irrigates not more than the total area previously irrigated by the superseded works.

(4) Any increase of capacity other than what falls under "Repair of Irrigation Reservoirs" as defined above shall be regarded as a "New Irrigation Reservoir."

II. The Mysore Government shall not, without the previous consent of the Madras Government, or before a decision under rule 4 below, build (*a*) any "New Irrigation Reservoirs" across any part of the thirteen main rivers named in the appended Schedule A, or across any stream named in Schedule B below the point specified in column 5 of the said Schedule B, or in any drainage area specified in the said Schedule B; or (*b*) any "new anicut" across the minor streams of Schedule A, *viz.*, 4 to 9, and 14 and 15, or across any of the streams of Schedule B, or

across the following major streams of Schedule A, lower than the points specified hereunder:—

Across 1. Tungabhadra—lower than the road crossing at Honnalli,
„ 10. Cauvery—lower than the Ramaswami Anicut, and
„ 13. Kabbini—lower than the Rampur Anicut.

III. When the Mysore Government desires to construct any "New Irrigation Reservoir" or any new anicut requiring the previous consent of the Madras Government under the last preceding rule, then, full information regarding the proposed work shall be forwarded to the Madras Government and the consent of that Government shall be obtained previous to the actual commencement of work. The Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the existence, extent and nature of such right, and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case.

IV. Should there arise a difference of opinion between the Madras and Mysore Governments in any case in which the consent of the former is applied for under the last preceding rule, the same shall be referred to the final decision either of Arbitrators appointed by both Governments, or of the Government of India.

V. The consent of the Madras Government is given to new irrigation reservoirs specified in the appended Schedule C, with the exception of the Srinivasasagara new reservoir across the Pennar, the Ramasamudram new reservoir across the Chitravati, and the Venkatesasagara new reservoir across the Papaghni. Should, owing to the omission of the Mysore Government to make or maintain these works in a reasonably adequate standard of safety, irrigation works in Madras, themselves, in a condition of reasonably adequate safety, be damaged, the Mysore Government shall pay to the Madras Government reasonable compensation for such damage.

As regards the three new reservoirs excepted above, the admissibility of any compensation from Mysore to Madras on account of loss accruing to Madras irrigation works from diminution of supply of water caused by the construction of the said works, will be referred to the Government of India whose decision will be accepted as final, and should such compensation be decided to be admissible, the decision of the Government of India as to the amount thereof will be accepted, after submission to them of the claims of Madras which should be preferred in full detail within a period of five years after the completion of said works.

VI. The foregoing rules shall apply as far as may be to the Madras Government as regards streams flowing through British Territory into Mysore.

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SCHEDULE A.

Main rivers.		Remarks.
1. Tungabhadra	...	.....
2. Tunga	...	Tributary of the Tungabhadra.
3. Bhadra	...	Do do
4. Hagari or Vedavati	...	Do do
5. Pennar or Northern Pinakini ...	...	.....
6. Chitravati	...	Tributary of the Pennar or the Northern Pinakini.
7. Papaghni	...	Do do do
8. Palar	...	.....
9. Pennar or Southern Pinakini ...	...	.....
10. Cauvery	...	.....
11. Hemavati	...	Tributary of the Cauvery.
12. Lakshmantirtha	...	Do do
13. Kabani	...	Do do
14. Honhole (or Suvarnavati) ...	...	Do do
15. Yagachi, up to the Belur bridge	...	Tributary of the Hemavati.

SCHEDULE B.

A list of the minor streams and catchments in Mysore territory on which no new irrigation reservoirs are to be built within the limits specified, without previous reference to the Madras Government.

Serial numbers in Schedule A	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
I	Tungabhadra ...	1 (a)	Choradi or Kumadvati.	Up to the bridge on this river on Honnali-Shikarpur road.	10 miles ...	.....
		1	Sulikere-halla ...	The bund of Sulikere tank ...	46 do ...	The Sulikere tank seldom discharges. This stream joins the Tungabhadra in Mysore territory.
		2	Sagali-halla ...	Up to the boundary line of the Channagiri taluk.	40 do ...	Above this point there are numerous existing tanks, and the run-off from these smaller catchments are of no appreciable importance to floods in the Tungabhadra river.
		3	Sarati-halla ...	As far as the boundary line of the Kakkargola and Avargola villages.	9½ do ...	A stream of insignificant importance to floods in the Tungabhadra river. This stream joins the Tungabhadra river in Mysore territory.
		4	Branch of Sarati-halla from east.	Up to Kadaji tank bund ...	16½ do ...	Catchment above the Kadaji tank small and insignificant.
		5	North Hagari ...	Up to boundary of Chitaldrug taluk.	12½ do ...	There are no existing Madras works on this branch of the Tungabhadra.
		6	Branch of Hagari	Up to Anaji tank bund ...	10 do ...	
		7	Sokke-halla ...	Up to the Hoskere tank bund.	9 do ...	No existing Madras works on the stream before it joins the North Hagari.
		8	Branch of Sokke-halla.	Up to the Kyasenhalli tank bund.	9 do ...	Catchments above Hosakere and Kyasenhalli tanks very small and insiguificant.
		9	Jiganhalli tank (Madras) catchment.	The whole of the outlying bit of Mysore territory which drains into this Madras tank.	.....	This is an outlying bit of Mysore territory in latitude 14-55'; longitude 76-38'.
		10	Anantapur tank (Madras) catchment.	The whole of the area of the extreme northern portion of the Molakalmuru taluk in Mysore which drains northwards into the Anantapur (Madras) tank catchment.	.....	There are existing Madras tanks below, and the whole area which drains into such tanks is included.
IV	Vedavati or Hagari	11	Chinna-Hagari ...	Up to where the stream crosses the frontier near Rangaiyandroog.	16 miles ...	No existing Madras works affected. This stream joins the main river about eight miles beyond the frontier.

SCHEDULE B—*contd.*

Serial numbers in Schedule A	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
		12	Sherikola-halla or Nagalapura tank (Madras) catchment.	The whole catchment area in Mysore territory.	.....	Affects the supply to Madras tank below.
		13	Rangasamudram tank (Madras) catchment.	The whole area of catchment of the tank in Mysore territory.	.....	The stream from this catchment leaves Mysore territory in latitude 14-37-'30" and longitude 76-48"-30".
		14	Yeradkere tank (Madras) catchment.	Do do ...	.....	The Yeradkere in Madras is on latitude 14-30'; longitude 76-57'-3".
		15	Main stream of the Talak drainage.	Up to the bridge over this stream on the Salem-Bellary road.	15½ miles ...	The road is a convenient point for a limit. No Madras works affected. This stream joins the Vedavati river within Mysore limits.
		16	Main stream of the Dodderi drainage.	Up to the boundary of the Hosahalli village.	17½ do ...	Latitude 14-21'; longitude 76-49'. No existing Madras works affected. This stream joins the Vedavati river within Mysore territory.
		17	Virapasamudram and Amarapur tank (Madras) catchments.	The whole area of catchment of this series in Mysore territory.	.....	This area represents a large proportion of the Pavagada taluk of Mysore.
V	Pennar or Northern Pinakini.	18	Mulkalkara tank (Madras) catchment.	Do do ...	.....	This Madras tank is situated in latitude 14-8'; longitude 77-26'-20".
		19	Ruddam tank (Madras) catchment.	Do do ...	.....	A considerable area in the north of the Maddagiri taluk of Mysore is on this catchment.
		20	Virapsamudram tank (Mysore) catchment.	The whole area of catchment of this series in Mysore territory.	.....	This terminal tank is in south-east corner of the Pavagada taluk of Mysore, but there are some Madras tanks above in the Madaksira Tahsildari. The catchment excluded from Mysore operations is chiefly in the north of the Maddagiri taluk.
		21	Purghi tank (Madras) catchment.	Do do ...	.....	The catchment excluded from Mysore operations is in the north of the Maddagiri taluk.
		22	Jayamangali river	Up to its junction with the Garudachala stream.	28 miles ...	The river above this point is of minor importance to Madras.
		23	Suvarnamukhi branch of Jayamangali.	Up to site of Rampur anicut.	25 do ...	Joins the Jayamangali a few miles below this point.
		24	Kumadvati ...	Up to site of anicut feeding the Kodagatur and Gundagal tanks in Mysore.	9½ do ...	This stream joins the Pennar on the Mysore frontier.
		25	Chaulur tank (Madras) catchment.	The whole direct catchment of this tank in Mysore territory.	.....	This Madras tank is on the west bank of the Pennar just outside Mysore territory.
		26	Western or Thondebhavi branch of the Pennar or N. Pinakini.	Up to its source	27 to 30 miles ...	.....
		27	Central or Varvani branch of the Pennar or N. Pinakini.	Do	25 miles ...	.....
		28	Hindupur tank (Madras) catchment.	The whole area of catchment of this series in Mysore territory.	.....	An important and large area of the Goribidnur taluk is here excluded from Mysore operations in a part where water for irrigation is much appreciated.
VI	Chitravati ...	29	Kushavati stream (Bukkapatna tank catchment in Madras).	Up to site of Daparti anicut.	10½ miles ...	The large Gudibanda tank in Mysore and the 20 smaller tanks above impound a very large proportion of the upper catchment already.
		30	Chitravati catchment (Bukkapatna tank catchment).	The whole area to the north of the Chelur-Bagenhalli road.	.....	This portion of the Chitravati catchment being more hilly and barren, the run-off is greater than in the more cultivated and level catchment to the south of the Chelur-Bagenhalli road.
VII	Papaghni river ...	31	Vandaman-halla ...	Up to Naremadipalli tank ...	9½ do ...	No Madras works affected up to the junction of this stream with the Papaghni River..

SCHEDULE B—*concld.*

Serial numbers in Schedule A	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
		32	Guntpalli tank (Madras) catchment.	The whole area of catchment in Mysore territory.	.....	This Madras tank is situated just above the large Vyasasamudram tank.
		33	Sadam tank (Madras) catchment.	The main stream up to its source.	17 to 18 miles ...	This Madras tank, the water-spread of which is partly in Mysore territory, drains into the Papaghni river just above the Vyasasamudram tank.
		34	Kotagal branch of the Papaghni.	Up to Kotagal tank ...	Do ...	The catchment above Kotagal tank is comparatively small and unimportant with numerous small tanks already on it.
		35	Tippasamudram tank (Madras) catchment.	The Marasanpalli-Digavakote stream up to Digavakote-Pathacheruvu tank; and the Marasanpalli-Gundedu stream up to Gundedu tank.	9½ miles ...	These are the only two important streams on this catchment, and above these terminal tanks, there are a large number of small tanks on the small drainages. These terminal tanks are only situated from 4 to 5 miles from the watershed of the Palar.
					13 do ...	
		36	Rangasamudram tank (Madras) catchment.	Adgal stream up to Adgal-Vasantanayikankere tank.	6½ do ...	The Adgal tank is situated 6 miles from the watershed, and there are numerous tanks in this distance.
				Kurigipalli branch stream up to the Kurigipalli tank.	4½ do ...	The Kurigipalli tank is only 4 miles from the watershed, and there are some 18 small tanks above it.
VIII	Palar river ...	37	Nangli (Mysore) tank drainage.	Main stream up to its source.	17½ miles ...	There are 12 Mysore tanks situated on this main stream.
		38	Shettikal (Mysore) tank drainage.	Do do ...	10 do ...	There are about 5 existing Mysore tanks and 1 breached tank on this main stream.
		39	Malinayikanhalli (Mysore) drainage.	Do do ...	6½ do ...	There are 4 existing Mysore tanks on this main stream.
		40	Vegnadgu (Mysore) drainage.	Do do ...	7 do ...	There are 4 existing Mysore tanks on this main stream.
		41	Tailur tank (Mysore) drainage.	Do do ...	23 do ...	There are 10 Mysore tanks on this important branch of the Palar, the terminal tank being 12½ miles from the frontier.
IX	Pennar or South Pinakini.	42	Verushuvavati river.	Main stream up to Koppa (or Kuppam) tank.	16 do ...	There are 76 tanks above the Koppa tank which is only some 12 miles from the watershed.
		43	Budikote stream ...	Main stream up to Thimmanayakanhalli tank.	21 do ...	There are 146 tanks above this terminal tank which is only about 12 miles from the watershed.
		44	Masti catchment ...	The whole area of catchment in Mysore territory.	.....	About 45·40 square miles in area in which there are 63 tanks in existence.
		45	Kadgodi drainage	Main stream up to its source.	36 miles ...	There are 10 Mysore tanks on this main stream now in use, most of them of large size.

SCHEDULE C.

A list of works already in progress, and which are to be allowed to be completed, although they would be barred by the proposed rules for restriction of Mysore operations.

Serial number in Schedule A	Main river drainage	Serial number of stream or catchment in Schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
I	Tungabhadra ...	.....	.....	.....	.....	.....	No works in progress on these catchments which are affected by the proposed rules submitted to Madras.
II	Tunga ...	.....	.....	.....	.....	.....	
III	Bhadra ...	.....	.....	.....	.....	.....	
IV	Hagari or Vedavati	17 ...	Restoration of the Arsikere Hampaiyandurga tank.	May 1889 ...	4,362	.....	The estimate provides for raising the weirs by 2 feet, and increasing capacity from 107 to 163 units. Work in abeyance owing to objection raised by Madras Government. But it is not intended to irrigate more than the area of land (189 acres) assessed as wet by the Revenue Survey.
		17 ...	Restoration of the Arsikere Gujjarappankere.	May 1889 ...	3,582	.....	The estimate provides for raising the weir by 1 foot, and to increase the capacity from 149 to 186 units. The raising of the weirs by 1 foot will not do more than compensate for the silting up of the bed for years.
V	Pennar or Northern Pinakini.	Main stream...	New Reservoir (Srinivasasagara) across the river near Kotagarahalli.	July 1888 ...	99,206	66,696	This new masonry dam with earthen bund on flanks is two-thirds completed. No Madras works affected. The capacity of the tank will be 610 units, and it is intended to irrigate 800 or more acres. This work is referred to by Colonel H. Smalley, R.E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation, Madras.
		28 ...	Restoration and improvement of Myalya tank.	September 1887	(Original Estimate) 14,452	.....	The capacity was increased from 95 units to 318 units, and the work is nearing completion. This tank is on the Hindupur (Madras) tank catchment, but only has a catchment of 38·80 square miles of its own.
				December 1889	(Revised Estimate) 17,168	13,130	
		28 ...	Raising the weirs of the Mahamalesvara tank.	September 1890	3,165	865	This is a small tank above the Myalya noted above. The estimate provides for increasing the capacity of the tank from 62 to 102 units, the former capacity having proved insufficient to irrigate the 198 acres of assessed wet lands. No increased area of irrigation is provided for. The total catchment above this tank is only 3 square miles.
		28 ...	Restoring the Manivala tank.	February 1889	4,094	2,860	The tank weir is to be raised 2 feet, and capacity increased from 139 to 211 units, but only in order to impound sufficient water to irrigate the tank's original atchkat of 350 acres.
VI	Chitravati ...	Main stream...	New Reservoir (Ramasamudram) near Periyasandra.	May 1888 ...	75,077	51,824	This reservoir is noticed by Colonel H. Smalley, R.E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation. It is to have a capacity of 1,207 units to irrigate 1,200 acres. The catchment area above the tank is 47·61 square miles.
		30 ...	Restoration of the Malsandra-Rachevar tank.	December 1888	4,742	4,724	Weirs of the tank were raised 2 feet, increasing the capacity from 105 units to 159 units. It is not intended to increase the area originally irrigated, 258 acres. The capacity of the tank is even now insufficient unless the tank fills 1½ times in the year. Work is nearly completed.

SCHEDULE C—*concld.*

Serial number in Schedule A	Main river drainage	Serial number of stream or catchment in Schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
VII	Papaghni river ...	Main stream ...	New Reservoir (Venkatesasagara) near Devaganhalli.	June 1888 ...	60,985	28,423	This work is noticed by Colonel H. Smalley, R. E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation. The tank will impound 517 units as designed, and will perhaps irrigate 750 acres if it fills 1½ times. The catchment above the tank is 61 square miles.
		Do ...	Restoring the Buradagunte anicut, channel and tank.	December 1888	25,575	17,350	This work consists in (1) building a masonry anicut with the usual earth flank bunds across the main stream, (2) restoring the old channel therefrom, and (3) restoring the Buradagunte Timmasani tank and increasing its capacity from 111 units to 167 units. This project is also noticed by Colonel Smalley in his report No. 674, dated 10th June 1890.
			Restoring the Timmanayakanhalli Agrahar tank.	August 1888 ..	16,776	13,234	Noticed also in Colonel Smalley's letter above quoted. This is a restoration of an old breached tank 26 miles up the main stream and 2 miles above the Chintamani-Bagenhalli road. The tank is to impound 240 units and irrigate 250 acres as against its original atchkat (irrigable area) of 330 acres as per Revenue Survey maps. Work is nearing completion.
		35 ...	Restoring Kotekallur tank.	April 1888 ...	6,564	5,690	This project consists in the restoration of a tank which breached in 1874, and provides for increasing its capacity from 25 to 80 units. It is six miles from the frontier on the Tippasamudram (Madras) tank catchment.
VIII	Palar river ...	37 ...	Restoring the Byatnur Nagavara tank.	September 1888	14,300	8,102	This is the terminal tank of the series. The capacity being increased from 152 to 320 units, it is only intended to irrigate the original area of 365 acres included in the atchkat.
		37 ...	Restoring Marandhalli tank.	March 1886, Revised estimate in July 1888.	5,345	5,254	The project provides for raising the weirs 3 feet and increasing the capacity from 121 to 186 units, to irrigate perhaps 250 acres. Work is nearing completion.
		41 ...	Restoring Jagalkashti-Dodkere tank.	April 1888, Revised estimate in January 1890.	7,246	7,210	Project provides for raising the weirs 3 feet and increasing capacity from 50 to 107 units. Work is nearly completed. No Madras works affected.
IX	Pennar or Southern Pinakini	Main stream ...	Restoring Bhadram tank.	April 1888 ...	21,689	15,033	The project provides for raising the weirs of this tank by 3 feet and increasing the capacity from 701 units to 1,225 units The work to the tank itself is nearly completed and only channels have now to be extended.
		44 ...	Restoration of Santehalli tank.	November 1889	7,480	4,076	This tank is in the Masti catchment. The weirs are to be raised 3 feet, and capacity increased from 93 to 151 units. No Madras works are affected.

From the First Assistant to the Resident in Mysore to the Secretary to the Government of Mysore, Public Works Department, dated Bangalore, the 26th March 1892, No. 1022—346-90.

With reference to your letter No. 3/1, dated the 4th January 1892, I am directed to inform you that the Rules and Schedules in connection with the restoration and construction of irrigation works in Mysore, forwarded therewith, are accepted by the Madras Government.

MEMORANDUM.

Some misapprehension appears to exist regarding the object and scope of the "Rules defining the limits within which no new "irrigation works are to be constructed by the "Mysore State without previous reference to the "Madras Government," which have been adopted by mutual agreement between the Governments of Madras and Mysore as per the marginally noted correspondence.

1. Letter No. 3/1, dated 4th January 1892, from Secretary to Government of Mysore, Public Works Department, to the First Assistant to the Resident.
2. Letter No. 1022—346-90, dated 26th March 1892, from the First Assistant to the Resident, to Secretary to Government of Mysore, Public Works Department.

2. These rules are not intended to curtail in any way the rights of the State to utilize the waters within its territorial limits. Such rights must always be decided on the merits of each case, according to the accepted principles of law applicable to the subject. Regarding these rights, I still hold the opinion given in the following paragraph of my Memorandum, dated 10th June 1890, forwarded to the Resident in Mysore with my letter of the same date:—

"6. I may perhaps be permitted to add a few remarks on the question of "the right to the water in dispute.

"(*a*) The supply of water which we propose to store and use for irrigation "and water-supply is only casual, intermittent, and exclusively "dependent upon the rainfall on Mysore land. We have a *natural* "right to collect and dispose of all water on the surface of our "land, and though, as between private owners, such *natural* right "would (subject to the exceptions hereafter to be noticed) be res-"tricted to water *not* flowing in a defined channel, the case of a "State is, I submit, very different. It has to deal with large inte-"rests and establish means of irrigation and water-supply over "extensive areas, and it cannot effectually dispose of surface water "before it enters some defined channel. And I submit that the "question as affecting the State has to be decided on the higher "grounds of public welfare and general prosperity and not accord-"ing to the strict rules of law applicable only to private rights.

"(*b*) The State naturally would have greater right of control over water "falling on the surface of its own lands and gathering into a "defined channel within its own frontier, than it would in the case "of a stream rising outside its frontier, and merely flowing through "it into the Madras districts; the obligations which may exist in "respect of a stream of the latter kind do not arise in any of the "cases under dispute. In all these cases, on the other hand, the "works we propose would tend to hold back river-floods running "more or less to waste and to establish more perennial streams "flowing from Mysore into the Madras districts.

"(*c*) If a right of easement by prescription is claimed on behalf of the "Madras ryots, I can only say (assuming that such a limiting right "as an easement can at all be acquired by Madras ryots against "the Mysore State) that it is most difficult to say what period of "time would be reasonable for the acquisition of such a right "against the State. For obvious reasons the twenty years of the "Easement Act would be too short a term, and in the case of

"Mysore, the fact of the British Administration of the Province "during half a century has an important bearing upon the question.

"Moreover, a right of easement can never be acquired by a mere *per-* "*missive* user. It cannot be said that Mysore never intended to "store its rainfall for irrigation and other purposes to a greater "extent than it used to do at some remote period. It is indeed "more reasonable to infer that the user in question was *permitted* "to be in force only so long as the State did not wish or were not "able to store more water. As a matter of fact, the history of the "Mysore Irrigation Department, as already shown, bears ample "testimony to the Mysore Government having always intended to "store and utilize as much of its rainfall as possible, and the pre- "sumption of a grant from prescriptive enjoyment is therefore "most distinctly and expressly negatived in the case of all Mysore "streams, to the extent to which they may be capable of being "utilized for irrigation and other purposes within Mysore territory.

"It is also most important to remember that the so-called right by "prescription cannot be claimed either in the case of recent Madras "works or recent enlargement of old Madras works: nor, as regards "water which now flows to waste over existing Madras works, can "any right whatsoever be claimed by Madras, for, the essence of a "prescriptive right is enjoyment and use, which cannot of course "be predicated of what is allowed to run to waste.

"And lastly, it is worthy of note that we have always impounded—in "increasing quantities as our works increased—as much of our "rainfall as possible. This increasing appropriation has, until re- "cently, never been objected to by Madras. This is not surprising "if we remember that (as pointed out by Colonel Sankey in his "letter of 19th November 1866) the old Mysore tank system was "so perfect that, were all tanks in their normal condition, none of "the drainage of 16,287 square miles commanded by the system "could possibly escape, and that, therefore, the so-called new works "and new or increased storage of water were, in reality, new "methods of securing what the old system secured in a different "way.

"And (*d*) even in the case of private riparian owners, they have the natural "right to use the water flowing through their land in a defined "channel for all reasonable purposes, including the irrigation of "land, *provided they do not thereby destroy or materially diminish* "*or affect the application of the water by riparian owners below the* "*stream*, either in exercise of their natural right or right of ease- "ment. (See Embrey *v.* Owen, 6, Exch., 372 and XI Indian Law "Reports, Madras 19.) Assuming, for the sake of argument, that "this well-recognized principle of Municipal law is applicable to "the case of two neighbouring Provinces, I am sanguine that it "would be found, upon investigation, that Mysore is strictly with- "in its right in carrying out the works to which objection has been "taken by the Madras Government."

3. The rules in question are intended for the guidance of our Engineers in the preparation of irrigation projects and to inform them as to the kind of new irrigation works regarding which the Durbar has undertaken to seek the previous consent of the Government of Madras, that Government on its own part agreeing "not to refuse such consent except for the protection of prescriptive right already "acquired and actually existing, the existence, extent and nature of such right, and "the mode of exercising it being in every case determined in accordance with "the law on the subject of prescriptive right to use of water, and in accordance with "what is fair and reasonable under all the circumstances of each individual case." In the case of a difference of opinion between the Governments of Madras and Mysore in any case, a reference to arbitration or the final decision of the Government of India is provided.

30

4. It is obvious from the above that the Madras Government cannot object on the ground of proposed or possible future new works in its own territory. Its objection must be on the ground of protection of rights already acquired and actually existing and not of rights hereafter by user and enjoyment.

5. Under such circumstances, in the case of any new irrigation work in Mysore, which comes under the class for which the rules in question provide a reference to the Madras Government, it is of the utmost importance to investigate beforehand, whether any "prescriptive right already acquired and actually existing" in Madras Territory is likely to be affected by the proposed Mysore work. Such investigation should include the collection of information as to the nature, extent and dimensions of any existing prescriptive right in Madras, when and how such right was acquired, how the same has been enjoyed, etc., *e.g.*, suppose a new work in Mysore (coming under the Rules) is at all likely to diminish the supply of water to an existing Madras tank, the information to be collected should include (1) when the Madras tank was constructed, or enlarged, (2) whether 20 years have elapsed since such construction or enlargement, (3) its capacity and the area which drains into it, (4) the area of actual irrigation under it, (5) whether the new Mysore tank is likely to cause any and what diminution of supply for the existing irrigation in Madras, and, if so, whether such diminution can be regarded as material or as causing any appreciable practical injury to such irrigation.

6. During my recent tour, the want of sufficient irrigation in Davangere taluk was strongly pressed upon my attention by the local officers. Some of the most eligible projects had not been investigated as being within the tract in which the rules in question have operation. They should be investigated on the lines above suggested.

7th September 1899. K. SHESHADRI IYER.

P.S.—In paragraph 2 of the rules "and 15" is a mistake, and no reference to the Madras Government should be necessary in respect of a new anicut across the Yagachi River.

K. S.

Exhibit My. 2-b.

The Representative of the Mysore Government, in reply to Col. Ellis, states, with reference to Rule 12 of the proposed rules, that the revision provided for therein has reference only to the interval of time required for water to travel from Kannambadi to the Cauvery dam.

The word "Provisional" in the heading of the rules has reference to the second paragraph of the covering letter and to Rule 12 as explained above.

FERN HILL,
Dated 26th July 1913.

KARPUR SHRINIVASRAV,
Offg. Secy. to the Govt. of Mysore, P. W. D.

26th July 1913.

H. D. GRIFFIN.
Arbitrator.

Karnataka State Archives
(Departmental Library)

37

Exhibit Ma. 2.

To

SIR H. D. GRIFFIN.

The Rules and Agreement of 1892 with Mysore which are signed by the Mysore Representative with attachments are herewith returned. The rules do not in all particulars agree with the Madras version. The chief difference is under Rule II. The Madras version has "fifteen" not "thirteen" main rivers and omits the words "minor" and "major" before "streams."

In the list of minor streams, Schedule B, the remarks under item IV 11 and item IV 16 are not the same in both versions.

2. The memorandum by the Dewan, Mysore, dated 7th September 1899, which is attached to the Mysore copy of the rules and which defines the object and scope of the rules does not appear to have been communicated to Madras and appears to be merely the expression of opinion of a former Dewan of Mysore.

The checking of the agreement and searching of files has taken some time and hence the delay in sending on the papers.

I send a signed copy of the Madras version of the agreement.

W. M. ELLIS, COL., R.E.,

26th July 1913. *Representative of the Madras Government.*

Enclosure to Ma. 2.

Rules defining the limits within which no new irrigation works are to be constructed by the Mysore State without previous reference to the Madras Government.

I. In these rules—

(1) "*New irrigation reservoirs*" shall mean and include such irrigation reservoirs or tanks as have not before existed, or, having once existed have been abandoned and been in disuse for more than thirty years past.

(2) A "new irrigation reservoir" fed by an anicut across a stream shall be regarded as a "*New irrigation reservoir across*" *that stream.*

(3) "Repair of irrigation reservoirs" shall include (*a*) increase of the level of waste weirs and other improvements of existing irrigation reservoirs or tanks, provided that either the quantity of water to be impounded, or the area to be irrigated, is not more than the quantity previously impounded, or the area previously irrigated, by them; and (*b*) the substitution of a new irrigation reservoir for and in supersession of an existing irrigation reservoir but in a different situation, or for and in supersession of a group of existing irrigation reservoirs, provided that the new work either impounds not more than the total quantity of water previously impounded by the superseded works, or irrigates not more than the total area previously irrigated by the superseded works.

(4) Any increase of capacity other than what falls under "Repair of irrigation reservoirs" as defined above shall be regarded as a "New irrigation reservoir."

II. The Mysore Government shall not, without the previous consent of the Madras Government, or before a decision under Rule 4 below build (*a*) any "New irrigation reservoirs" across any part of the fifteen main rivers named in the appended Schedule A, or across any stream named in Schedule B below the point specified in column 5 of the said Schedule B, or in any drainage area specified in the said Schedule B; or (*b*) any "new anicut" across the streams of Schedule A,

Nos. 4 to 9 and 14 and 15, or across any of the streams of Schedule B, or across the following streams of Schedule A, lower than the points specified hereunder:—

Across 1. Tungabhadra—lower than the road crossing at Honnali,
„ 10. Cauvery—lower than the Ramaswami anicut, and
„ 13. Kabbini—lower than the Rampur anicut.

III. When the Mysore Government desires to construct any "New irrigation reservoir" or any new anicut requiring the previous consent of the Madras Government under the last preceding rule, then full information regarding the proposed work shall be forwarded to the Madras Government and the consent of that Government shall be obtained previous to the actual commencement of work. The Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the existence, extent and nature of such right and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case.

IV. Should there arise a difference of opinion between the Madras and Mysore Governments in any case in which the consent of the former is applied for under the last preceding rule, the same shall be referred to the final decision either of arbitrators appointed by both Governments, or of the Government of India.

V. The consent of the Madras Government is given to new irrigation reservoirs specified in the appended Schedule C, with the exception of the Srinivasasagara new reservoir across the Pennar, the Ramsamudram new reservoir across the Chitravati, and the Venkatesasagara new reservoir across the Papaghni. Should, owing to the omission of the Mysore Government to make or maintain these works in a reasonably adequate standard of safety, irrigation works in Madras, themselves in a condition of reasonably adequate safety, be damaged, the Mysore Government shall pay to the Madras Government reasonable compensation for such damage.

As regards the three new reservoirs excepted above, the admissibility of any compensation from Mysore to Madras on account of loss accruing to Madras irrigation works from diminution of supply of water caused by the construction of the said works, will be referred to the Government of India whose decision will be accepted as final, and should such compensation be decided to be admissible, the decision of the Government of India as to the amount thereof will be accepted, after submission to them of the claims of Madras which would be preferred in full detail within a period of five years after the completion of said works.

VI. The foregoing rules shall apply, as far as may be, to the Madras Government as regards streams flowing through British territory into Mysore.

SCHEDULE A.

Main rivers.	Remarks.
1. Tungabhadra	.....
2. Tunga	Tributary of Tungabhadra.
3. Bhadra	Do do
4. Hagari or Vedavati	Do do
5. Pennar or Northern Pinakini... ...	.....
6. Chitravati	Tributary of Pennar or Northern Pinakin..
7. Papaghni	Do do
8. Palar	.....
9. Pennar* or Southern Pinakini. ...	.....
10. Cauvery	.....
11. Hemavati	Tributary of the Cauvery.
12. Lakshmantirtha	Do do
13. Kabbini	Do do
14. Honhole (or Suvarnavati)	Do do
15. Yagachi, up to the Belur bridge ...	Tributary of the Hemavati.

* Known as the "Ponniar" in Madras.

SCHEDULE B.

A list of the minor streams and catchments in Mysore territory on which no new irrigation reservoirs are to be built within the limits specified without previous reference to the Madras Government.

Serial numbers in Schedule A	Drainages	Serial numbers on map	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
I	Tungabhadra ...	1 (*a*)	Charodi or Kumadvati.	Up to the bridge on this river on Honnali-Shikarpur road.	10 miles ...	.....
		1	Sulikere-halla ...	The bund of Sulikere tank.	46 do ...	The Sulikere tank seldom discharges. This stream joins the Tungabhadra in Mysore territory.
		2	Sagali-halla ...	Up to the boundary line of the Channagiri taluk.	40 do ...	Above this point there are numerous existing tanks, and the run-off from these smaller catchments are of no appreciable importance to floods in the Tungabhadra river.
		3	Saratihalla ...	As far as the boundary line of the Kakkargola and Avargola villages.	9½ do ...	A stream of insignificant importance to floods in the Tungabhadra river. This stream joins the Tungabhadra river in Mysore territory.
		4	Branch of Saratihalla from east.	Up to Kadaji tank bund ...	16½ miles ...	Catchment above the Kadaji tank small and insignificant.
		5	North Hagari ...	Up to boundary of Chitaldrug taluk.	12½ do ...	There are no existing Madras works on this branch of the Tungabhadra.
		6	Branch of do ...	Up to Anaji tank bund ...	10 do ...	
		7	Sokke-halla ...	Up to the Hosakere tank bund.	9 do ...	No existing Madras works on this stream before it joins the North Hagari. Catchments above Hoskere and Kyasenhalli tanks very small and insignificant.
		8	Branch of Sokke-halla.	Up to the Kyasenhalli tank bund.	9 do ...	
		9	Jiganhalli tank (Madras) catchment.	The whole of the outlying bit of Mysore territory which drains into this Madras tank.	.....	This is an outlying bit of Mysore territory in latitude 14-55′; longitude 76-38′.
		10	Anantapur tank (Madras) catchment.	The whole of the area of the extreme northern portion of the Molakalmuru taluk in Mysore which drains northwards into the Anantapur (Madras) tank catchment.	.....	There are existing Madras tanks below, and the whole area which drains into such tanks is included.
IV	Vedavati or Hagari.	11	Chinna-Hagari...	Up to where the stream crosses the frontier near Rangaiyandroog.	16 miles ...	This stream joins the main river about 8 miles beyond the frontier.
		12	Sherikola-halla or Nagalapura tank (Madras) catchment.	The whole catchment area in Mysore territory.	.....	Affects the supply to Madras tank below.
		13	Rangasamudram tank (Madras) catchment.	The whole area of catchment of the tank in Mysore territory.	.....	The stream from this catchment leaves Mysore territory in latitude 14-37′-30″ and longitude 76-48′-30″.
		14	Yeradakere tank (Madras) catchment.	Do do ...	.....	The Yeradkere in Madras is on latitude 14-30′; longitude 76-57′-30″.
		15	Main stream of the Talak drainage.	Up to the bridge over this stream on the Salem-Bellary road.	15½ miles ...	The road is a convenient point for a limit. This stream joins the Vedavati river within Mysore limits.
		16	Main stream of the Doderi drainage.	Up to the boundary of the Hosahalli village.	17½ do ...	Latitude 14-21′; longitude 76-19′. This stream joins the Vedavati river within Mysore territory.

SCHEDULE B—*contd.*

Serial numbers in Schedule A	Drainages	Serial numbers on map	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
IV	Vedavati or Hagari—*contd.*	17	Virapsamudram and Amarapur tank (Madras) catchments.	The whole area of catchment of this series in Mysore territory.	.....	This area represents a large proportion of the Pavagada taluk of Mysore.
V	Pennar or Northern Pinakini.	18	Mulkalkara tank (Madras) catchment.	Do do ...	.....	This Madras tank is situated in latitude 14-8′; longitude 77-26′-20″.
		19	Ruddam tank (Madras) catchment.	Do do ...	.....	A considerable area in the north of the Maddagiri taluk of Mysore is on this catchment.
		20	Virapsamudram tank (Mysore) catchment.	Do do ...	.....	This terminal tank is in south-east corner of the Pavagada taluk of Mysore, but there are some Madras tanks above in the Madakasira Tahsildari. The catchment excluded from Mysore operations is chiefly in the north of the Maddagiri taluk.
		21	Purghi tank (Madras) catchment.	Do do ...	.....	The catchment excluded from Mysore operations is in the north of the Maddagiri taluk.
		22	Jayamangali river.	Up to its junction with the Garudachala stream.	28 miles ...	The river above this point is of minor importance to Madras.
		23	Suvarnamukki branch of Jayamangali.	Up to site of Rampur anicut.	25 miles ...	Joins the Jayamangali a few miles below this point.
		24	Kumadvati ...	Up to site of anicut feeding the Kodagatur and Gundagal tanks in Mysore	9½ do ...	This stream joins the Pennar on the Mysore frontier.
		25	Chaulur tank (Madras) catchment.	The whole direct catchment of this tank in Mysore territory.	...	This Madras tank is on the west bank of the Pennar just outside Mysore territory.
		26	Western or Thondebhavi branch of the Pennar or North Pinakini.	Up to its source ...	27 to 30 miles.	.....
		27	Central or Varvani branch of the Pennar or North Pinakini.	Do ...	25 miles ...	.....
		28	Hindupur tank (Madras) catchment.	The whole area of catchment of this series in Mysore territory.	...	An important and large area of the Goribidnur taluk is here excluded from Mysore operations in a part where water for irrigation is much appreciated.
VI	Chitravati ...	29	Kushavati stream (Bukkapatna tank catchment in Madras).	Up to site of Daparti anicut.	10¾ miles ...	The large Gudibanda tank in Mysore and the 20 smaller tanks above impound a very large proportion of the upper catchment already.
		30	Chitravati catchment (Bukkapatna tank catchment).	The whole area to the north of the Chelur-Bagenhalli road.	...	This portion of the Chitravati catchment being more hilly and barren, the run-off is greater than in the more cultivated and level catchment to the south of the Chelur-Bagenhalli road.
VII	Papaghni river...	31	Vandamanhalla.	Up to Naremadipalli tank...	9½ miles ...	No Madras works affected up to the junction of this stream with the Papaghni river.
		32	Guntpalli tank (Madras) catchment.	The whole area of catchment in Mysore territory.	...	This Madras tank is situated just above the large Vyasasamudram tank.

SCHEDULE B—*concld.*

Serial numbers in Schedule A	Drainages	Serial numbers on map	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
VII	Papaghni river—*concld.*	33	Sadam tank (Madras) catchment.	The main stream up to its source.	17 to 18 miles,	This Madras tank, the water-spread of which is partly in Mysore territory, drains into the Papaghni river just above the Vyasasamudram tank.
		34	Kotagal branch of the Papaghni	Up to Kotagal tank ...	Do ...	The catchment above Kotagal tank is comparatively small and unimportant with numerous small tanks already on it.
		35	Tippasamudram tank (Madras) catchment.	The Marasanpalli-Digavakote stream up to Digavakote-Pathacheruvu tank; and the Marasanpalli Gundedu stream up to Gundedu tank.	9½ miles ... 13 do ...	These are the only two important streams on this catchment, and above these terminal tanks there are a large number of small tanks on the small drainages. These terminal tanks are only situated from 4 to 5 miles from the watershed of the Palar.
		36	Rangasamudram tank (Madras) catchment.	Adgal stream up to Adgal-Vasantanayikankere tank.	6½ do ...	The Adgal tank is situated 6 miles from the watershed, and there are numerous tanks in this distance.
				Kurigepalli branch stream up to the Kurigepalli tank.	4½ do ...	The Kurigepalli tank is only 4 miles from the watershed, and there are some 18 small tanks above it.
VIII	Palar river ...	37	Nangli (Mysore) tank drainage.	Main stream up to its source.	17½ miles ...	There are 12 Mysore tanks situated on this main stream.
		38	Shettikal (Mysore) tank drainage.	Do do ...	10 do ...	There are about 5 existing Mysore tanks and 1 breached tank on this main stream.
		29	Malinayikanhalli (Mysore) drainage.	Do do ...	6½ do ...	There are 4 existing Mysore tanks on this main stream.
		40	Vegmadgu (Mysore) drainage.	Do do ...	7 do ...	There are 4 existing Mysore tanks on this main stream.
		41	Tailur tank (Mysore) drainage.	Do do ...	23 do ...	There are 10 Mysore tanks on this important branch of the Palar, the terminal tank being 12½ miles from the frontier.
IX	Pennar* or South Pinakini.	42	Verushuvavati river.	Main stream up to Koppa (or Kuppam) tank.	16 do ...	There are 76 tanks above the Koppa tank which is only some 12 miles from the watershed.
		43	Budikote stream	Main stream up to Thimmanayakanhalli tank.	21 do ...	There are 146 tanks above this terminal tank which is only about 12 miles from the watershed.
		44	Masti catchment	The whole area of catchment in Mysore territory.	.....	About 45·40 square miles in area in which there are 63 tanks in existence.
		45	Kadgodi drainage.	Main stream up to its source.	36 miles ...	There are 10 Mysore tanks on this main stream now in use, most of them of large size.

* Known as the "Ponniar" in Madras.

SCHEDULE C.

A list of works already in progress, and which are to be allowed to be completed, although they would be barred by the proposed rules for restriction of Mysore operations.

Serial number in Schedule A	Main river drainage	Serial number of stream or catchment in Schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
I	Tungabhadra	...	.....	.....	.....	.....	No works in progress on these catchments which are affected by the proposed rules submitted to Madras.
II	Tunga ...	...	.....	.....	.....	.....	
III	Bhadra ...	...	.....	.....	.....	.....	
IV	Hagari or Vedavati.	17	Restoration of the Arsikere Hampaiyandurga tank.	May 1889 ...	4,362	.....	The estimate provides for raising the weirs by 2 feet and increasing capacity from 107 to 163 units. Work in abeyance owing to objection raised by Madras Government. But it is not intended to irrigate more than the area of land (189 acres) assessed as wet by the Revenue Survey.
		17	Restoration of the Arsikere-Gujjarappankere tank.	May 1889 ...	3,582		The estimate provides for raising the weir by 1 foot and to increase the capacity from 149 to 186 units. The raising of the weirs by 1 foot will not do more than compensate for the silting up of the bed for years.
V	Pennar or Northern Pinakini.	Main stream	New Reservoir (Srinivasasagara) across the river near Kotagarahalli.	July 1888 ...	99,206	66,696	This new masonry dam with earthen bund on flanks is two-thirds completed. No Madras works affected. The capacity of the tank will be 610 units, and it is intended to irrigate 800 or more acres. This work is referred to by Colonel H. Smalley, R.E., in his No. 674, dated 10th June 1890. to Chief Engineer for Irrigation, Madras.
		28	Restoration and improvement of Myalya tank.	Sept. 1887 ...	(Original estimate) 14,452		The capacity was increased from 95 units to 318 units and the work is nearing completion. This tank is on the Hindupur (Madras) tank catchment, but only has a catchment of 38·80 square miles of its own.
				Dec. 1889 ...	(Revised estimate) 17,168	13,130	
		28	Raising the weirs of the Mahamalesvara tank.	Sept. 1890 ...	3,165	865	This is a small tank above the Myalya noted above. The estimate provides for increasing the capacity of the tank from 62 to 102 units, the former capacity having proved insufficient to irrigate the 198 acres of assessed wet lands. No increased area of irrigation is provided for. The total catchment above this tank is only 3 square miles.
		28	Restoring the Manivala tank	Feb. 1889 ...	4,094	2,860	The tank weir is to be raised 2 feet, and capacity increased from 139 to 211 units, but only in order to impound sufficient water to irrigate the tank's original atchkat of 350 acres.

SCHEDULE C—*contd.*

Serial number in Schedule A	Main river drainage	Serial number of stream or catchment in Schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
VI	Chitravati ...	Main stream	New Reservoir (Ramasamudram) near Periyasandra.	May 1888 ...	75,077	51,824	This reservoir is noticed by Colonel H. Smalley, R.E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation. It is to have a capacity of 1,207 units to irrigate 1,200 acres The catchment area above the tank is 47·61 square miles.
		30	Restoration of the Malsandra-Rachevar tank.	Dec. 1888 ...	4,742	4,724	Weirs of the tank were raised 2 feet, increasing the capacity from 105 units to 159 units. It is not intended to increase the area originally irrigated, 258 acres. The capacity of the tank is even now insufficient unless the tank fills 1½ times in the year. Work is nearly completed.
VII	Papagni river	Main stream.	New Reservoir (Venkatesasagara) near Devaganhalli.	June 1888 ...	60,985	28,123	This work is noticed by Colonel H. Smalley, R.E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation. The tank will impound 517 units as designed, and will perhaps irrigate 750 acres if it fills 1½ times. The catchment above the tank is 61 square miles.
			Restoring the Buradagunte anicut, channel and tank.	Dec. 1888 ...	25,575	17,350	This work consists in (1) building a masonry anicut with the usual earth flank bunds across the main stream, (2) restoring the old channel therefrom, and (3) restoring the Buradagunte Timmasani tank and increasing its capacity from 111 units to 167 units. This project is also noticed by Colonel Smalley in his report No. 674, dated 10th June 1890.
			Restoring the Timmanayakanhalli Agrahar tank.	Aug. 1888 ...	16,776	13,234	Noticed also in Colonel Smalley's letter above quoted. This is a restoration of an old breached tank 26 miles up the main stream and 2 miles above the Chintamani-Bagenhalli road. The tank is to impound 240 units and irrigate 250 acres as against its original atchkat (irrigable area) of 330 acres as per Revenue Survey maps. Work is nearing completion.
		35	Restoring Kotekallur tank.	April 1888...	6,564	5,690	This project consists in the restoration of a tank which breached in 1874, and for increasing its capacity from 25 to 80 units. It is 6 miles from the frontier on the Tippasamudram (Madras) tank catchment.
VIII	Palar river ...	37	Restoring the Byatnur Nagavara tank.	Sept. 1888 ...	14,300	8,102	This is the terminal tank of the series. The capacity being increased from 152 to 320 units. It is only intended to irrigate the original area of 365 acres included in the atchkat.

SCHEDULE C—*concld.*

Serial number in Schedule A	Main river drainage	Serial number of stream or catchment in Schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
VIII	Palar river—*concld.*	37	Restoring Marandhalli tank.	March 1886. Revised estimate in July 1888.	5,345	5,254	The project provides for raising the weirs 3 feet and increasing the capacity from 121 to 186 units, to irrigate perhaps 250 acres. Work is nearing completion.
		41	Restoring Jagalkashti-Dodkere tank.	April 1888. Revised estimate in January 1890.	7,246	7,210	Project provides for raising the weirs 3 feet and increasing capacity from 50 to 107 units. Work is nearly completed. No Madras works affected.
IX	Pennar * or Southern Pinakini.	Main stream.	Restoring Bhadram tank.	April 1888...	21,689	15,033	The project provides for raising the weirs of this tank by 3 feet and increasing the capacity from 701 units to 1,225 units. The work to the tank itself is nearly completed and only channels have now to be extended.
		44	Restoration of Santehalli tank.	Nov. 1889 ...	7,480	4,076	This tank is in the Masti catchment. The weirs are to be raised 3 feet, and capacity increased from 93 to 154 units. No Madras works are affected.

*Known as the "Ponniar" in Madras.

Exhibit Ma. 3.

Reply of the Madras Government to the statement of the Mysore case presented by Mysore to the Committee of Arbitration on the 21st July 1913.

(The parts and paragraphs referred to are those in the Mysore case.)

PART I.—PRELIMINARY.

Paragraph 1.—The Mysore Durbar gave a distinct undertaking in letter No. 347-Pol., dated 26th October 1911, from the Dewan (copy attached), that the fact of the Durbar having built a dam of wider foundations than are necessary for the small reservoir of 11,030 million cubic feet capacity, shall not be brought forward in any future discussion as an argument for the construction of a larger reservoir. It is therefore submitted that the last sentence of this paragraph is entirely irrelevant and is introduced merely as a topic of prejudice.

PART II.—PRESCRIPTIVE RIGHTS OF MADRAS.

Paragraphs 3 *and* 4.—In the correspondence on the subject the discussion has hitherto been confined to the quantity of water which Madras required under the conditions existing in 1910, but the Madras Government accept the statement that they are entitled to the quantity to which in 1910 they had a prescriptive right.

Under this admission of the Durbar Madras have a right to a larger quantity than they claimed originally and they now put forward the following as their claim in lieu of that given in paragraph II of Exhibit Ma. 1:—

"II. The proposals put forward by Madras are that the regulation of water "in the working of the Mysore Reservoir must be such as to give to Madras yearly "throughout the period, June to February (inclusive), the whole flow of the river "up to the quantities specified below:—

"(i) A discharge in the Aganda Cauvery at the Upper Anicut sufficient to "secure a flow over the Cauvery dam of a depth of 7 feet, under the conditions "existing prior to the remodelling of the Upper Anicut between 1899 and 1902.

"(*Note.*—Such discharge under normal conditions is computed as equivalent "to 2,989 million cubic feet in 24 hours made up of 2,300 million cubic feet passing "over the Cauvery dam and 689 million cubic feet passing over the old Upper "Anicut under the conditions of that work before remodelling.)

"(ii) This discharge to be measured on the Cauvery and its tributaries, "immediately above the waterspread of Kannambadi Reservoir, and at a station "on the Kabbini river about forty miles above its junction with the Cauvery.

"(iii) During the south-west monsoon (June to September) an allowance "of 25 *per cent*, on the flow in Mysore to provide for losses in transmission between "Sivasamudram and the Upper Anicut.

"(iv) During the period, March to May, inclusive, a supply of not less than "900 cusecs passed without interruption through the left branch of the river at "Sivasamudram."

Under the conditions on which the above claims are formulated, the supply of the Veeranam tank and the Lower Anicut System is secured and no separate claim on this account is made, and the claim previously made under (II) (*c*) based on the actual existing practice is waived.

The Madras Government do not admit that the second part of paragraph 4 correctly represents the extent of their prescriptive rights. This is in no way limited to the actual extent of land irrigated, or amount of water used, in the three years before and three years after 1890.

PART III.—REQUIREMENTS OF MADRAS IRRIGATION.

Paragraph 5.—This is not a complete statement of Madras claims which are now formulated in the reply to Mysore paragraphs 3 and 4 above.

Paragraph 6.—The fact of the rare occurrence of a flow reaching the limit claimed in certain months, is no argument for depriving Madras of that limit flow when it is received.

Short freshes in the months of low supply have frequently been of the greatest service in saving the irrigated area from severe loss.

The prescriptive right of Madras during the months mentioned is to the whole flow of the river up to the limit claimed, and for this claim there is full justification, and proof of actual use and enjoyment can be adduced.

In the months of November and December a flow over the Cauvery Dam at the Upper Anicut up to, or exceeding, the limit depth claimed, has been realized on 64 days in the twenty years considered (1890 to 1909). It is thus not correct to say that the depth was "rarely ever reached."

Madras is entitled by prescriptive right to the limit flow claimed whenever available.

Paragraph 7.—The accuracy of the statement made in the first two lines is denied. The statement in the last sub-paragraph is also denied, and the record of discharges of the Cauvery dam fully supports such denial.

In the paragraph quoted from the Madras Cauvery Project Report, there is an error in the original, and "one foot" at the end of the fifth line of the quotation should be altered to "two feet."

Paragraph 8.—The Government of Madras do not admit that a claim for a certain maximum is untenable because the average is much below the maximum.

If the maximum were lowered, the average would also fall; and the fact that the average in certain months is very low furnishes an argument for raising, not for reducing, the maximum.

The contention of Mysore that the supply of water to Madras should be restricted to, or regulated by, the fortnightly averages is entirely fallacious.

Paragraph 9.—The Government of Madras do not admit that their claims should be reduced in periods when the river supply is normally low; the fact that the limit of high supply flow is seldom available in certain months is not a valid reason for depriving Madras of the enjoyment of such a flow, when it does come.

The Government of Madras do not admit that the harvest extends from September to February.

As regards allowances for rainfall, it was found impossible in connection with the Madras Cauvery Reservoir Project to frame any rules for making allowances for rainfall in the irrigated area.

This area is two days' flow from the site of the Metur Cauvery dam, and another day is required to pass the water on to the fields; the sight of the Mysore Reservoir is double the distance of the proposed Madras Reservoir from the Cauvery dam.

The collection and transmission of rainfall statistics would take one day; six days would therefore elapse between the fall of rain and the time when the reduced supplies of water to be passed in consequence of the rainfall would reach the irrigated area. It is considered impracticable to frame rules for allowing a reduction in issue at the Mysore Reservoir in consequence of rainfall in the irrigated area.

Paragraph 10.—The table given in paragraph 8 of the Mysore statement is reproduced below with an additional column (No. 5) showing the depth of flow obtained half-monthly by increasing the allowances made for the Metur Reservoir (shown in column 4) by 30 *per cent*.

The Madras Government note with satisfaction the reasonable admission made by Mysore, that an addition of 25 to 30 *per cent* in the quantities of water provided for in the Madras Reservoir Project (as shown in column 4) should be made on account of the uncertain and fluctuating nature of the supplies under a system of direct flow, and accept this admission which, it is hoped, will prove a great step *towards a settlement of the matter.*

Table from Mysore case with column 5 added.

Months		Average depths corresponding to average fortnightly discharge	Average depths corresponding to maximum fortnightly discharge	Average depths now proposed by Madras in connection with their new project	Depths representing discharge 30 per cent. more than those of column 4
(1)		(2)	(3)	(4)	(5)
June ...	1st half	3·5	5·4	2·9	3·5
	2nd half	5·1	6·4	2·9	3·5
July ...	1st half	5·7	7·0	6·1	6·8
	2nd half	6·4	7·0	6·1	6·8
August ...	1st half	6·6	8·C	5·9	6·6
	2nd half	6·0	7·0	5·9	6·6
September ...	1st half	5·6	6·7	5·8	6·5
	2nd half	5·2	6·4	4·7	5·1
October ...	1st half	5·4	6·9	5·0	5·5
	2nd half	5·4	6·6	4·2	4·7
November ...	1st half	5·0	6·6	3·8	4·3
	2nd half	4·4	6·5	3·8	4·3
December ...	1st half	3·9	6·4	3·0	3·6
	2nd half	3·0	5·1	1·7	2·0
January ...	1st half	2·5	4·6	2·1	2·5

The total quantity of water representing the flow at depths shown in column 5 has been worked out to be 255,628 million cubic feet in the period 1st June to 15th January, as compared with the total of average flow, according to column 2, of 250,055 million cubic feet.

Thus, the average flow of the past twenty years, actually realized under the rules of regulation in force during the period, is between 25 and 30 *per cent* greater than the supplies provided for in the Madras Cauvery Project, and such flow is now admitted by Mysore to be reasonable.

Paragraph 11.—Mysore reject any claims for the supply of the Lower Coleroon Anicut System of irrigation on the authority of the statement quoted by them from paragraph 11, Volume I, Madras Cauvery Project Report.

The fact that the system does not, under ordinary circumstances, receive *any regulated supply under existing conditions* and is dependent, to a great extent, on the surplus of freshes and floods is not inconsistent with a claim for specific supply, when it is proposed altogether to alter *the existing conditions* by impounding, in an ordinary year, a material part of the floods which now feed the system, and in a bad year, almost all the flood water surpluses now passed through the Upper Anicut. It is proposed to cut off the chief source of supply to the system, *viz.*, the surplus water available after feeding the Cauvery Delta System, which is now passed through the Upper Anicut.

To these floods Madras have prescriptive right, and they are the chief source of supply of the Lower Coleroon Anicut System, especially of the Veeranam tank. To compensate for the losses of supply by impounding floods by Mysore, specific allowances for feeding the Lower Anicut System may reasonably be claimed.

A specific allowance was made for the Coleroon irrigation in the Madras Cauvery Project* (*vide* the end of the paragraph quoted by Mysore), although no rules for regulation were formulated; the statement made that no allowance has been made is denied. Moreover, any flood impounded in a Madras Reservoir is held impounded at the call of Madras authorities and in the interests of the irrigated lands in the Cauvery and Coleroon deltas. In the case of the Mysore Reservoir the floods will be impounded and diverted to another area altogether.

* Paragraph 11, Volume I, Madras Cauvery Project Papers.

Under the revised claim now made, a special allowance for the Lower Anicut System is not claimed in consideration of the different conditions on which the revised claim is based.

Paragraph 12.—The foregoing remarks are applicable to the case of the claim made for the Veeranam tank, which forms part of the Lower Anicut System.

The suggestion that the Veeranam tank ayacut, an area of 52,400 acres, should depend on the catchment area of the Veeranam tank, an area of 95* square miles, is wholly untenable. Even if the catchment had a good south-west monsoon rainfall which it has not, it would require a catchment area of upwards of 1,000 square miles to feed such an area of irrigation and a capacity from five to six times its existing capacity of 1,490 million cubic feet.

The claim advanced by the Government of Madras for occasional additional supplies is fully covered by existing prescriptive right and based on existing practice and custom.

It is admitted that no claim has previously been advanced for a specific supply for the Lower Anicut System, but the necessity for making such a claim was stated at a very early stage of the discussion—*vide* paragraph 3 of Note by the Chief Engineer for Irrigation, which accompanied letter No. R.O.C. 386 I./10 of 6th December 1910, from the Joint Secretary to the Government of Madras, Public Works Department, to the Resident in Mysore. This states "the Special "Superintending Engineer's draw-off tables show what water can be impounded by "Mysore and the period during which it may be so impounded by Mysore, but, as "indicated in his note, *no allowance has been made for Coleroon irrigation, and it "will probably be necessary on this account to make a reduction in the quantity of "water available.*"

While Mysore were contesting as excessive the tentative figures, based on the ordinary system of regulation, initially assumed for purposes of computation and as a basis for argument, it was obviously futile, and only leading to fruitless controversy, to propose that these should be enhanced.

Although it was known that some provision for the Lower Anicut System would be necessary, it is only, since the decision to submit the matter to arbitration that the conditions of supply of the Veeranam tank and Lower Coleroon Anicut System have been made the subject of any real study and consideration, and it has therefore only now been possible to advance complete proposals. Under the revised claim now made, no special supply is claimed for the Veeranam tank and the claim to the additional occasional supply is waived.

Paragraph 13.—The Government of Madras do not admit the contention put forward in this paragraph which is based on the fallacy exposed in the reply to paragraph 8.

PART IV.—PLACE OF MEASUREMENT OF SUPPLY DUE TO MADRAS.

Paragraph 14.—The Government of Madras claim that the flow of the river should be measured above the water-spread of Kannambadi Reservoir and at a selected site on the Kabbini. Allowances of 25 *per cent* for losses in transmission between Sivasamudram and the Upper Anicut are claimed during the south-west monsoon. The Madras discharge records of flow at Bhavani Bridge are reliable, except for high floods and discharges below 1,000 cusecs. This is stated in paragraphs 29 and 30, Volume III, Madras Cauvery Project Report.

The bed of the river at Bhavani bridge is rocky and not liable to scour, and the discharges are reliable.

The statement that the discharges are unreliable is now made by the Mysore Government for the first time and they are put to the proof of this statement.

It is noted that Mysore admit that the discharges at the Cauvery dam are reliable. Those at Bhavani Bridge are equally reliable.

As regards the gaugings of discharge at Sivasamudram, a statement of these was furnished by the Durbar to the Madras Government, and put forward as accurate, except for flood discharges, as lately as the 31st March last, by the Dewan of Mysore in his letter No. 838-Pol. of 31st March 1913, paragraph 2, which runs as follows: "with reference to paragraph 2 of the Madras Government letter, I "may point out that there are accurate records of discharges both at Sivasamu-"dram and at Bhavani bridge for more than nine years"

These discharges have been used as the basis of arguments throughout the discussions which have taken place, and are the only basis of the Mysore proposals, so far as concerns the safeguarding of Madras supplies.

* Later on corrected to 256 square miles.

They have also been used as the basis of the Madras case as regards comparison of discharge records for computing losses in transmission and show that the occasional losses are great.

It is now stated that for gauging "high floods" the site is unsuitable, and this is admitted.

It is, however, also stated in contradiction of everything previously put forward that "the past records of gauge readings are unreliable." Such a statement appears to foreshadow a repudiation by Mysore of the discharges based on gauge-readings at Sivasamudram, that is, of all the discharges furnished to Madras, notwithstanding the Dewan's admission that these discharges were accurate except for high floods.

This sudden repudiation of gauge-readings as "not reliable" cannot be acquiesced in by Madras in view of the previous statements officially made by Mysore, that the discharges based on these gauge-readings are "accurate."

Paragraph 15.—The Madras claim is for a measurement of the flow of the Cauvery above Kannambadi, and on the Kabbini, with an allowance of 25 *per cent* for *net* loss in transmission during the south-west monsoon.

In working on the system proposed by Mysore based on measurements at the Upper Anicut, losses in transmission on compensation water, passed to make up excess balances impounded by Mysore, will still be necessary.

The percentage in this case is, however, not the same, and 30 *per cent.* on the quantity of compensation water would in such a case be required to provide for such loss.

Part V.—System of Regulation.

Paragraph 16.—It is for Mysore to put before the Arbitrator the proposals and details of their project fully and clearly. So far as Madras is concerned, the most important item of the Mysore Project, and the one which must be adjudicated on before all others, is the method of regulation.

It is for Mysore to state clearly and fully the system of regulation proposed for their project.

It is not for the Arbitrator to "devise" the system of regulation of the Mysore Project, but to adjudicate on the system proposed by Mysore, or in the alternative on the proposal of the Government of Madras, making such amendments in matters of details as may appear to him necessary.

Paragraph 17.—It is denied that water ever passes from Kannambadi to the Cauvery dam in one day which is equivalent to a mean velocity of 14 feet per second or 9·66 miles per hour.

In saying that Mysore should be enabled to store all water "in excess of that to be given for irrigation at the Cauvery dam," the Durbar ignores the obligation to supply the 95,000 acres of Madras irrigation above the Upper Anicut. This area alone is about 65 *per cent* of the area proposed to be irrigated under the Mysore Project and is certainly not a negligible quantity.

Mysore may suffer from the circumstance which fixes the site of their reservoir at so great a distance up the river from the bulk of the Madras irrigation, but this is no ground for adopting a remedy which would entail continuous risk of loss, and not infrequent actual loss, to Madras.

Paragraph 19.—It is denied that, in a stage of river discharge which limits the maximum flow to a "depth of 6 or 7 feet" at the Cauvery dam, the mean velocity of flow is 7 feet a second (4·83 miles per hour), which is what is necessary for transmission of the supply in two days, and the Mysore Government are put to the proof of this.

For the stages of flow which will rule when the Mysore Reservoir is under regulation, allowance for time of transmission which will fairly meet the circumstances of the case is considered to be 3½ days, and Madras is prepared to adduce evidence in support of this proposition.

The second part of this paragraph is not understood, but it is denied that in the months of July and August the local rainfall near the Cauvery dam produce floods.

PART VI.—PROPOSED REGULATION TO BE TENTATIVE.

Paragraphs 20, 21 *and* 22.—The Madras Government most strongly oppose a tentative settlement. They demand that rules for regulation at the Mysore Reservoir and the water supplies to be passed to Madras should be settled now.

Further, they demand full examination of the proposals for the larger project proposed by Mysore, and a decision regarding the refusal of assent by Madras to the proposals put forward. The Government of Madras press for a final decision as to whether the large reservoir proposed by Mysore may be built or not.

In the interests of Mysore as well as Madras, a final settlement of this question is most desirable, so that it may be known definitely what dimensions are required for the dam at Kannambadi, on which work has already been commenced. The arbitration in progress has been ordered by the Government of India with a view to a definite and final settlement of the matters at issue. The Government of Madras demand that the decisions of the Arbitrator shall be a final and binding settlement of the questions involved.

The Mysore Durbar have had this project in view for many years. In his letter No. 869-Pol. of 27th March 1911 to the Resident, a copy of which was forwarded to the Government of India with the Resident's letter No. 2053-E.I. of 3rd April 1911, the Dewan states as follows: "For many years the Mysore Gov-"ernment have intended to construct a reservoir on the Cauvery for developing "irrigation in the valley."

It was obviously under such circumstances the duty of Mysore to make suitable gaugings and measurements of discharge during these many years, and to some degree they appear to have done so. It is not open to Mysore to claim postponement of settlement on the ground of the inaccuracy of such measurements, until now described by them as accurate. On most of the points to be decided, postponement for six years would not result in production of any more relevant or reliable facts than will be now at the disposal of the Arbitrator, while *data* collected specially to prove one proposition or another would even, if sufficient, be open to suspicion.

On the matter of quantity of water to which Madras had in 1910 prescriptive right, evidence taken now must be better than evidence taken at the end of six years. Accordingly a final and binding decision is pressed for.

In six years' time there will be little or no more information available as a guide to drawing up rules for fixing the system of regulation.

The matter of losses in transmission is, it is admitted, a complex one, but such losses can only be computed on consideration of the results of bad years. The nine years, regarding which gaugings are available, include three bad years, and it is improbable that a period of six years would give better information in this respect.

The Government of Madras ask for decisive, final, and binding decisions on the points at issue.

PART VII.—NO OUTSIDE INTERFERENCE WITH DISTRIBUTION OF WATER.

Paragraph 23.—The Government of Madras claim no right of interference with the "internal distribution" of water in Mysore territory, meaning by this the distribution of the water to the enjoyment of which it is decided that Mysore has a title.

The Government of Madras do, however, insist on their right to such limited interference as may be necessary to secure that the rules for the regulation of impounding in and issues from Kannambadi Reservoir are duly observed.

The Government of Madras, however, claim that full detail of the scope and character of the project proposed by Mysore shall be communicated to them and laid before the Arbitrator.

The points on which information is required in addition to what is included in the printed books describing the Mysore Project are noted below:—

(*a*) A statement of the proposed half-monthly "draw-off" for all irrigation channels taking off from the reservoir.

(*b*) A statement of the proposed half-monthly "draw-off" of each of the Mysore channels below the dam existing or proposed which will be fed from water issued from the reservoir sluices.

(*c*) A "duty table" showing draw-off per acre proposed half-month by half-month for the channels—

(i) taking off from the reservoir;

(ii) taking off below the reservoir and fed from the reservoir sluices.

(*d*) Statement of areas, and seasons of "draw-off," as regards each of the above channels separately stated with respect to—

(i) Monsoon crop.

(ii) Dry season crop.

(iii) Crops requiring perennial supply.

(*e*) Areas and details of any proposed extension of irrigation above the reservoir rendered practicable by supplying existing irrigation below the reservoir from it.

(*f*) The maximum discharge which each new channel taking off from the reservoir is to be designed to carry.

(*g*) Rules for regulation of the reservoir regarding issue of water to Mysore irrigation and restrictions imposed so as to absolutely secure an uninterrupted full supply to the power installation.

(*h*) Full details of allowance made for reduction in reservoir capacity by deposition of silt, and of the number of years it is computed such allowance will enable the original effective capacity to be maintained unimpaired.

(*i*) Tables of daily discharges past Kannambadi as such are necessary for investigating the effect of the Mysore "Rules for Regulation of the Reservoir" on the Madras existing irrigation.

Full details of the methods of computation of the discharges and data on which these tables are based should be furnished, the details being sufficient to enable all such computations to be verified by Madras officers and by the Arbitrator.

(*j*) The Durbar should also furnish full engineering particulars concerning the dam, its sluices, surplus works and all works which may affect Madras, and designs of the same.

As regards the last lines of the Mysore statement, paragraph 23, it is not clear to what restrictions Mysore is referring.

As already stated, the Madras Government do not wish to interfere with the distribution of the water which Mysore may be held by the Arbitrator to be entitled to use.

As regards the construction of reservoirs or other irrigation works, Rule VI of the Agreement of 1892 imposes on Madras similar restrictions with reference to streams flowing through Madras territory into Mysore.

Part VIII.—Supply due to Mysore.

Paragraph 24.—The statements in this paragraph are irrelevant to the matter at issue.

Part IX.—Creation of new Prescriptive Rights undesirable.

Paragraph 25.—The statements are irrelevant.

Paragraph 26.—The Government of Madras entirely repudiate the suggestion put forward in the first two lines.

Paragraphs 25 and 26 introduce matters which are altogether outside the scope of the present reference and should therefore be dismissed from consideration.

Part X.—Other points for consideration.

Paragraph 27.—The Government of Madras claim that no infringement whatever of Madras existing rights shall be permitted.

Paragraph 28.—The statement made is denied.

Paragraph 29.—The fact that Madras may possibly construct a reservoir at Metur hereafter is wholly irrelevant to the arbitration.

The Madras Government deny that the construction of such a reservoir would afford just ground for reducing the amount of water to which they are now entitled.

The Madras Government have full liberty to deal as they please with the water to which they have a prescriptive right, and it cannot for a moment be admitted that the Mysore Durbar has any right to benefit by works constructed by the Madras Government. Moreover, construction by Madras of works on the Cauvery below the Mysore frontier is not covered by the Agreement of 1892 and is wholly irrelevant to this arbitration.

Paragraph 30.—It is denied that the flow realised in the month of June up to the limit of flow claimed is "mostly allowed to run into the sea." In the Madras Cauvery Project, to which reference is given, the remarks alluded to are made by a Revenue Officer who had not access to the water registers and who qualified the whole paragraph with the initial remark "I have heard it said."

Paragraph 31.—This appears to be a plea to respect the prescriptive rights of Madras in certain years when water is plentiful, and to ignore them in bad years. The Madras Government altogether repudiate such a suggestion, and insist that Mysore must be bound by her obligations to respect Madras prescriptive rights throughout every year, no matter what its character.

Part XI.—Terms of Reference and Conclusion.

Paragraph 34.—The statements in this paragraph are irrelevant.

Should the Government of Madras undertake the construction of a reservoir on the Cauvery, such construction will in no way diminish their prescriptive rights, or their title to whatever water may now be decided to be justly due to them.

Paragraph 35.—Sufficient reasons for refusing assent to the Mysore Reservoir have been given to the Government of Mysore with the original refusal. The further reasons subsequently put forward strengthen the Madras case.

The Government of Madras believe that they have furnished ample justification of their refusal to assent to the construction of the proposed work.

If the water to which they are entitled is passed down, there is strong reason to believe, from the data so far available, that the Mysore project must fail and the Durbar should therefore not be allowed to carry it into execution.

The existence of such a work would be a serious menace to the Madras Irrigation of over one million acres, since in years of short supply there would be risk of a breach of the rules for the regulation of impounding, owing to the pressure which is bound to be brought to bear on those controlling the impounding.

Conclusion.

The Government of Madras do not admit any statement in the Mysore case which has not been expressly admitted above.

Copy of Letter No. 347-Pol., dated 26th October 1911, from the Dewan of Mysore to the Honourable the Resident in Mysore.

In continuation of my letter No. 328, dated the 19th October 1911 on the subject of the construction of a reservoir on the Cauvery at Kannambadi, I have the honour to inform you that, as desired by the Government of Madras, the Durbar definitely undertake that the fact of their having built a dam of wider foundations than are necessary for the small reservoir of 11,030 million cubic feet shall not be brought forward in any future discussion as an argument for the construction of a larger reservoir.

Reply of Madras as regards the Mysore "Provisional Rules for working the Mysore Reservoir" handed in to the Arbitration Committee on 26th July 1913 (Exhibit My. 2).

1. The Madras Government cannot assent to the proposals in paragraph 1 of the Mysore rules.

The flow limits at the Cauvery dam which Mysore suggest as the supply which will satisfy the existing prescriptive rights of Madras are altogether inadequate and do not give to Madras irrigation a supply even approaching in volume that admitted by Mysore to be reasonable in paragraph 10 of the "Statement of the case for Mysore."

2. The system of control of regulation described in the Mysore Rules 2, 3, 4, 5, 6 and 7 is exactly similar to that proposed by the Dewan of Mysore in his letter No. 11-Camp of 10th May 1912 (Exhibit Ma. 1-*a*) alluded to in the Madras Statement of Case (Exhibit Ma. 1) with the exception that the limit supplies, instead of being 26,700 cusecs, are as shown in paragraph 1 of the new rules, while the period during which Mysore is to be permitted to impound all flow is now fixed as commencing on the 1st February instead of on the 1st March as proposed in the previous rules above specified. Both these deviations are open to still greater objection than the rules originally proposed.

These rules are as regards Madras supplies much more unfavourable than those referred to and rejected in the Madras statement (Exhibit Ma. 1), and cannot, for reasons already given in Exhibit Ma. 1, be accepted by Madras.

3. The effect of paragraph 8 of the rules is to give to the Mysore Officer in charge of the works at Kannambadi extensive discretionary powers to depart from the rules for impounding.

The Madras Government object to any discretionary power being given to deviate from any rules which may be decided on for ensuring the passing of suitable supplies to Madras.

4. In addition to the objections above stated, the rules are considered impossible to work either smoothly or efficiently and are also open to the other objections set forth in the reply of Madras to the Mysore statement of their case (Exhibit My. 1) submitted on the 21st July.

W. M. ELLIS, COL., R.E.,
Representative of the Madras Government.

Exhibit Ma. 3-a.—List of certain papers handed over by the Madras Representative to the Mysore Representative—Not printed.

Exhibit Ma. 3-b.

I am instructed to ascertain through the Arbitrator whether Mysore intends to put in a further pleading by way of rejoinder on perusal of our reply, now put in, to their statement of the case and *Rules of Regulation*.

I am specifically instructed to object to the settlement of issues before the pleadings are fully put in.

29th July 1913. W. M. ELLIS, COL., R.E.

Exhibit My. 4.

ENQUIRY INTO THE QUESTION OF STORAGE OF THE CAUVERY WATERS WITHIN MYSORE TERRITORY.

Reply of the Madras Government to the statement of the Mysore case presented by Mysore to the Committee of Arbitration on the 21st July 1913.

Rejoinder by the Mysore Durbar to the reply presented by the Madras Government to the Committee of Arbitration on 29th July 1913.

[*The parts and paragraphs referred to are those in the Mysore case.*]

PART I.—PRELIMINARY.

Paragraph 1.—The Mysore Durbar gave a distinct undertaking in letter No. 347—Pol., dated 26th October 1911, from the Dewan (copy attached), *that the fact of the Durbar having built a dam of wider foundations than is necessary for the small reservoir of 11,030 m.c.ft. capacity, shall not be brought forward in any future discussion as an argument for the construction of a larger reservoir. It is therefore submitted that the last sentence of this paragraph is entirely irrelevant and is introduced merely as a topic of prejudice.

It has been clearly stated in the previous correspondence that wider foundations would be laid. It is referred to here merely as a statement of fact and not as an argument.

PART II.—PRESCRIPTIVE RIGHTS OF MADRAS.

Paragraphs 3 *and* 4.—In the correspondence on the subject the discussion has hitherto been confined to the quantity of water which Madras required under the conditions existing in 1910, but the Madras Government accept the statement that they are entitled to the quantity to which in 1910 they had a prescriptive right.

The modifications made in the demands of the Madras Government are wholly unwarranted. The statement claimed to be an admission by the Durbar is merely an explanation of what is meant by prescriptive right. If the Madras Government had not been enjoying any of the rights claimed continuously for 20 years after 1890, they have no claim to them now. If the Madras Government imply by the statement that more water was used before the remodelling of the upper anicut, they have lost the right to such supply since the remodelling took place. Similarly, any special right acquired by Madras after the remodelling cannot constitute a prescriptive right. They must prove that whatever quantity is claimed as due to them has been peacefully enjoyed without interruption for 20 ears.

**Letter No. 347—Pol., dated 26th October 1911, from the Dewan of Mysore, to the Honourable the Resident in Mysore.*

In continuation of my letter No. 328, dated the 19th October 1911, on the subject of the construction of a reservoir on the Cauvery at Kannambandi, I have the honour to inform you that, as desired by the Government of Madras, the Durbar definitely undertake that the fact of their having built a dam of wider foundations than are necessary for the small reservoir of 11,030 million cubic feet shall not be brought forward in any future discussion as an argument for the construction of a larger reservoir.

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
Under this admission of the Durbar Madras have a right to a larger quantity than they claimed originally and they now put forward the following as their claim in lieu of that given in paragraph II of Exhibit Ma. 1 :—	
" II. The proposals put forward by " Madras are that the regulation of water " in the working of the Mysore Reservoir " must be such as to give to Madras " yearly throughout the period, June to " February (inclusive), the whole flow of " the river up to the quantities specified " below :—	
" (i) A discharge in the Aganda " Cauvery at the Upper Anicut sufficient " to secure a flow over the Cauvery Dam " of a depth of 7 feet, under the conditions " existing prior to the remodelling of the " Upper Anicut between 1899 and 1902.	The claim to a uniform flow in all the months is untenable, *vide* paragraphs 5 to 13 of the Mysore statement.
" *Note.*—Such discharge under nor- " mal conditions is computed as equiva- " lent to 2,989 million cubic feet in 24 " hours made up of 2,300 million cubic " feet passing over the Cauvery Dam and " 689 million cubic feet passing over the " old Upper Anicut under the conditions " of that work before remodelling.	The figures given seem to be arbitrary. If a quantity up to 2,300 m.c. ft. would suffice for deltaic irrigation of about one million acres, the call for 689 million cubic feet for about one-tenth of this area seems disproportionate.
" (ii) This discharge to be measured " on the Cauvery and its tributaries, " immediately above the waterspread of " Kannambadi Reservoir, and at a station " on the Kabbani river about forty miles " above its junction with the Cauvery.	(ii) This would exclude the replenish- ment from all the rest of the catchment area measuring over 20,000 square miles out of a total of 26,172 square miles and therefore cannot be accepted by Mysore.
" (iii) During the south-west mon- " soon (June to September) an allowance " of 25 *per cent*, on the flow in Mysore " to provide for losses in transmission " between Sivasamudram and the Upper " Anicut.	(iii) Mysore refuse to accept the pro- posal to measure at Sivasamudram or any higher point ; so the question of this extra allowance does not arise.
" (iv) During the period, March to " May inclusive, a supply of not less than " 900 cusecs passed without interruption " through the left branch of the river at " Sivasamudram."	(iv) No reasons have been given for this claim put forward for the first time. The Madras Government have repeatedly stated in the previous correspondence that the entire flow in the river from March to May is placed at the disposal of Mysore. It may be stated here that the summer flow in the river is not 900 cusecs, but is known to go down as low as 94 cusecs.
Under the conditions on which the above claims are formulated, the supply of the Veeranam tank and the Lower Anicut System is secured and no separate claim on this account is made, and the claim previously made under (II) (*c*) based on the actual existing practice is waived.	

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Reply of Madras Govt.	Rejoinder by Mysore Durbar.
The Madras Government do not admit that the second part of paragraph 4 correctly represents the extent of their prescriptive rights. This is in no way limited to the actual extent of land irrigated, or amount of water used, in the three years before and three years after 1890.	
Part III.—Requirements of Madras Irrigation.	
Paragraph 5.—This is not a complete statement of Madras claims which are now formulated in the reply to Mysore paragraphs 3 and 4 above.	The new claims formulated have been shown to be untenable in the rejoinder against paragraphs 3 and 4.
Paragraph 6.—The fact of the rare occurrence of a flow reaching the limit claimed in certain months, is no argument for depriving Madras of that limit flow when it is received.	
Short freshes in the months of low supply have frequently been of the greatest service in saving the irrigated area from severe loss.	It is not denied by Madras that these limits are only very rarely reached and thus are not dependable. Although occasional use may have been made of the extra water, it cannot be established that the raiyats base their operations on such undependable supplies in the river. It cannot also be established that every occasional freshet has been actually utilised.
The prescriptive right of Madras during the months mentioned is to the whole flow of the river up to the limit claimed, and for this claim there is full justification, and proof of actual use and enjoyment can be adduced.	
In the months of November and December a flow over the Cauvery Dam at the Upper Anicut up to, or exceeding, the limit depth claimed has been realized, on 64 days in the twenty years considered (1890 to 1909). It is thus not correct to say that the depth was "rarely ever reached."	Even 64 (the correct number is 61) days out of 20 years (each of two months or 61 days) form only about five per cent of the period and this cannot be called anything but "rare." In 12 out of these 20 years such a limit has not been reached at all. The Madras Government do not question the statement "that in January and February the limit was never reached except for 2 days in 20 years" and yet they do not give up their claim to 7 feet for those months.
Madras is entitled by prescriptive right to the limit flow claimed whenever available.	The limit from the very nature of things cannot be the same for all the months; To arrive at a fair settlement of the case, it should be based more on general conditions of supply and use in each month than on rare, uncertain or exceptional freshes.
Paragraph 7.—The accuracy of the statement made in the first two lines is denied. The statement in the last subparagraph is also denied, and the record of discharges of the Cauvery Dam fully supports such deniel.	*Vide* Rejoinder to Madras reply to paragraphs 3 and 4.

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
In the paragraph quoted from the Madras Cauvery Project Report, there is an error in the original, and " one foot " at the end of the fifth line of the quotation should be altered to " two feet."	The quotation is admitted to be correct by Madras. The correction to " two feet " now made is accepted. It only strengthens the view already put forward, *viz.*, that a much larger quantity is now forced down for irrigation than before the remodelling of the anicut in 1902.
Paragraph 8.—The Government of Madras do not admit that a claim for a certain maximum is untenable because the average is much below the maximum. If the maximum were lowered the average would also fall, and the fact that the average in certain months is very low furnishes an argument for raising, not for reducing, the maximum. The contention of Mysore that the supply of water to Madras should be restricted to, or regulated by, the fortnightly averages is entirely fallacious.	The maximum supply can never be usefully utilised on any particular day when the requirements for that day, say, as estimated in the Metur Reservoir Project, are much less. In fact the requirements of a standing crop on any day are more or less settled and although such a crop may suffer when the supplies available are short, it cannot be established that all the excess over the standard quantity can be usefully utilised. Much of this must run to waste. If by maximum is meant, the maximum quantity really necessary and actually used, then the conclusion would be correct. But if the maximum due to the haphazard high flow is to be taken, then the average resulting from such abnormal flow cannot all be useful to a crop. Hence the claim for all flood waters above the *normal maximum required* for a crop is untenable. The depths of water required for the delta irrigation are based upon such averages in the Madras Metur Project. The abnormal and occasional floods over the depths therein provided would be more or less wasted. To make up for the fluctuations, the limit of flow proposed, above which impounding is permissible, has already been taken at 25 to 30 per cent more than the provision made in the Metur Project.
Paragraph 9.—The Government of Madras do not admit that their claims should be reduced in periods when the river supply is normally low; the fact that the limit of high supply flow is seldom available in certain months is not a valid reason for depriving Madras of the enjoyment of such a flow, when it does come.	The point is when the higher floods are rare and uncertain, no real and useful enjoyment can be possible. It would not be " fair and reasonable " to claim such high and more or less unnecessary limits.
The Government of Madras do not admit that the harvest extends from September to February.	The passage in the Mysore statement is not correctly interpreted.
As regards allowances for rainfall, it was found impossible in connection with	It may be true that it would be difficult to frame hard and fast rules beforehand.

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
the Madras Cauvery Reservoir Project to frame any rules for making allowances for rainfall in the irrigated area.	But in practice much can be done by a system of timely notice and regulation especially when the rainfall is more or less continuous as happens during the north-east monsoon. Such continuous rainfall often occurs in the months of October to December in the deltaic area. That this is possible has been recognised by the Madras Engineers themselves as already pointed out in paragraph 9 of the Mysore statement of case.
This area is two days' flow from the site of the proposed Metur Dam, and another day is required to pass the water on to the fields; the site of the Mysore reservoir is double the distance of the proposed Madras reservoir from the Cauvery Dam.	Although the effect of rainfall on any particular day may be difficult to allow for, still the condition of crops under a more or less continuous or heavy rainfall as in the north-east monsoon, will indicate to what extent or period the supplies may be reduced in any particular week or ten day period, and the benefit of the saving of water on such occasions should not be denied to Mysore.
	In describing the system of cultivation in the delta, the Madras Engineers have admitted that, if there are 4 inches of rainfall in a fortnight, the crops are independent of river supplies (*vide* paragraph 19, page 5, Volume I of Metur Project). The rainfall records show that there are many such fortnights during the north-east monsoon.
The collection and transmission of rainfall statistics would take one day; six days would therefore elapse between the fall of rain and the time when the reduced supplies of water to be passed in consequence of the rainfall would reach the irrigated area. It is considered impracticable to frame rules for allowing a reduction in issue at the Mysore reservoir in consequence of rainfall in the irrigated area.	If careful observations are made to this end for a term of years, it should be easy to frame rules to enable Mysore to store the supplies set free by rain in the irrigated area.
	Also, the period of flow, here arrived at by Madras, requires check and confirmation by careful observations for a term of years. But in the light of the above remarks concerning rainfall, the period of flow will not much matter.
Paragraph 10.—The table given in paragraph 8 of the Mysore statement is reproduced below with an additional column (No. 5) showing the depth of flow obtained half-monthly by increasing the allowances made for the Metur Reservoir (shown in column 4) by 30 *per cent.*	
The Madras Government note with satisfaction the reasonable admission made by Mysore, that an addition of 25 to 30 *per cent* in the quantities of water provided for in the Madras Reservoir Project as shown in column 4) should be made	A wrong construction has been put on the original statement. The rules proposed by Mysore make it unmistakeably clear that Mysore never meant that they would undertake to supply the total volume due to a continuous flow equivalent

REPLY OF MADRAS GOVT.

on account of the uncertain and fluctuating nature of the supplies under a system of direct flow, and accept this admission which, it is hoped, will prove a great step *towards a settlement of the matter.*

REJOINDER BY MYSORE DURBAR.

to the average depths mentioned. They only agreed to allow a flow *up to that limit* whenever it was available in the river (*vide* clause 1 of the Mysore Rules-Ex. My. 2.)

Table from Mysore case with column 5 added.

Months		Average depths corresponding to average fortnightly discharge	Average depths corresponding to maximum fortnightly discharge	Average depths now proposed by Madras in connection with their new project	Depths representing discharge 30 per cent more than those of column 4
(1)		(2)	(3)	(4)	(5)
June ...	1st half ...	3·5	5·4	2·9	3·5
	2nd half ...	5·1	6·4	2·9	3·5
July ...	1st half ...	5·7	7·0	6·1	6·8
	2nd half ...	6·4	7·0	6·1	6·8
August ...	1st half ...	6·6	8·0	5·9	6·6
	2nd half ...	6·0	7·0	5·9	6·6
September ...	1st half ...	5·6	6·7	5·8	6·5
	2nd half ...	5·2	6·4	4·7	5·1
October ...	1st half ...	5·4	6·9	5·0	5·5
	2nd half ...	5·4	6·6	4·2	4·7
November ...	1st half ...	5·0	6·6	3·8	4·3
	2nd half ...	4·4	6·5	3·8	4·3
December ...	1st half ...	3·9	6·4	3·0	3·6
	2nd half ...	3·0	5·1	1·7	2·0
January ...	1st half ...	2·5	4·6	2·1	2·5

The total quantity of water representing the flow at depths shown in column 5 has been worked out to be 255,628 m.c.ft. in the period 1st June to 15th January, as compared with the total of average flow, according to column 2, of 250,055 m.c.ft.

Thus, the average flow of the past twenty years, actually realized under the rules of regulation in force during the period, is between 25 and 30 *per cent* greater than the supplies provided for in the Madras Cauvery Project, and such flow is now admitted by Mysore to be reasonable.

This is not admitted (*vide* rejoinder above).

Paragraph 11.—Mysore reject any claims for the supply of the Lower Coleroon Anicut System of irrigation on the authority of the statement quoted by them from paragraph 11, Volume I, Madras Cauvery Project Report.

The fact that the system does not, under ordinary circumstances, receive *any regulated supply under existing conditions* and is dependent, to a great extent, on the surplus of freshets and floods is not inconsistent with a claim for specific supply, when it is proposed altogether to alter *the existing conditions* by impounding, in an ordinary year, a material part of the floods which now feed the system, and in a bad

The interference with Coleroon irrigation will be much less under the Mysore Project than under the proposed Madras Metur Project.. It is true that it is proposed to guarantee a continuous average flow under the Metur scheme while the Kannambadi Reservoir will give the depths contemplated only when there is a flow in the river. *Per contra*, the limits for impounding in the Mysore Reservoir as noted above are 25 to 30 per cent more ; and what is much more important, the interference with the natural flow by the Mysore Reservoir is very much less. For, the Mysore Reservoir will intercept only 4,100 square miles of catchment area while the Metur Reservoir will intercept about

REPLY OF MADRAS GOVT.

year, almost all the flood water surpluses now passed through the Upper Anicut. It is proposed to cut off the chief source of supply to the system, *viz.*, the surplus water available after feeding the Cauvery delta system, which is now passed through the Upper Anicut.

To these floods Madras have prescriptive right, and they are the chief source of supply of the Lower Coleroon Anicut System, especially of the Veeranam tank. To compensate for the losses of supply by impounding floods by Mysore, specific allowances for feeding the Lower Anicut System may reasonably be claimed.

A specific allowance was made for the Coleroon irrigation in the Madras Cauvery Project* (*vide* the end of the paragraph quoted by Mysore), although no rules for regulation were formulated; the statement made that no allowance has been made is denied. Moreover, any flood impounded in a Madras reservoir is held impounded at the call of Madras authorities and in the interest of the irrigated lands in the Cauvery and Coleroon deltas. In the case of the Mysore reservoir the floods will be impounded and diverted to another area altogether.

Under the revised claim now made, a special allowance for the Lower Anicut System is not claimed in consideration of the different conditions on which the revised claim is based.

Paragraph 12.—The foregoing remarks are applicable to the case of the claim made for the Veeranam tank, which forms part of the Lower Anicut System.

The suggestions that the Veeranam tank ayacut, an area of 52,400 acres, should depend on the catchment area of the Veeranam tank, an area of 95 square miles, is wholly untenable. Even if the catchment had a good south-west monsoon rainfall, which it has not, it would require a catchment area of upwards of 1,000 square miles to feed such an area of irrigation and a capacity from five to six times its existing capacity of 1,490 million cubic feet.

* Paragraph 11, Volume I, Madras Cauvery Project Papers.

REJOINDER BY MYSORE DURBAR.

15,700 square miles. Besides, under the Mysore scheme not more than 150,000 acres of new irrigation is contemplated, while under the Madras scheme the extent of new irrigation projected is 355,000 acres.

It is acknowledged in the report on the Madras Project that when the supplies to the Cauvery delta system are adequate, no *separate* allowance is necessary for Coleroon irrigation. If suitable provision for delta irrigation is made, it *ipso facto* covers the needs of Coleroon irrigation as well.

This refers to a claim made very recently by the Madras Government and now withdrawn. No explanation or comment seems necessary. It may, however, be observed that the Madras Government have, from the commencement, been asking for a percentage addition to the supply actually drawn off in the past at the Cauvery Dam (Upper Anicut). But it is a noteworthy fact that the additional claim was at one time 10 per cent. This was suddenly raised to 25 per cent with a further addition of 66 m.c.ft. daily for the Veeranam tank, and from the figures now given (2,300 and 689 m.c.ft.,) it is nearly 30 per cent. The reasons for this extra claim have been variously stated at various times. First, it was stated that this was required for the lower irrigation. On another occasion, it was to cover transmission

REPLY OF MADRAS GOVT.

The claim advanced by the Government of Madras for occasional additional supplies is fully covered by existing prescriptive right and based on existing practice and custom.

It is admitted that no claim has previously been advanced for a specific supply for the Lower Anicut System, but the necessity for making such a claim was stated at a very early stage of the discussion—*vide* paragraph 3 of Note by the Chief Engineer for Irrigation, which accompanied letter No. R.O.C. 386 I./10 of 6th December 1910, from the Joint Secretary to the Government of Madras, Public Works Department, to the Resident in Mysore. This states "the Special "SuperintendingEngineer'sdraw-off tables "show what water can be impounded by "Mysore, and the period during which it "may be so impounded by Mysore, but, as "indicated in his note *no allowance has* "*been made for Coleroon irrigation and it* "*will probably be necessary on this account* "*to make a reduction in the quantity of* "*water available.*"

While Mysore were contesting as excessive the tentative figures, based on the ordinary system of regulation, initially assumed for purposes of computation and as a basis for argument, it was obviously futile, and only leading to fruitless controversy, to propose that these should be enhanced.

Although it was known that some provision for the Lower Anicut System would be necessary, it is only, since the decision to submit the matter to arbitration, that the conditions of supply of the Veeranam tank and Lower Coleroon Anicut System have been made the subject of any real study and consideration, and it has therefore only now been possible to advance complete proposals Under the revised claim now made, no special supply is claimed for the Veeranam tank and the claim to the additional occasional supply is waived.

Paragraph 13.—The Government of Madras do not admit the contention put forward in this paragraph which is based on the fallacy exposed in the reply to paragraph 8.

REJOINDER BY MYSORE DURBAR.

losses between Sivasamudram and Cauvery Dam. Now, Veeranam tank has been brought in for the first time besides the Coleroon irrigation. Statements made on such shifting grounds cannot be admitted.

Mysore have done their best to meet the claim of Madras by suggesting methods of regulation. It is true that the limits of flow at the Cauvery Dam above which Mysore may impound, have been indicated with reference to the fortnightly averages, as this seems to be a fair and reasonable basis to go upon. As

REPLY OF MADRAS GOVT.

REJOINDER BY MYSORE DURBAR.

a set-off for the uncertainty of the supplies, the Durbar have proposed an addition of 25 to 30 per cent to the project quantities to determine the limits. The fact must also be taken into consideration that although Mysore may be enabled to impound above the limits indicated at the Cauvery Dam, yet the quantity that can be actually impounded would be limited to the flow available at Kannambadi. For, only one-seventh of the catchment area will be actually intercepted at Kannambadi and the flow from six-sevenths of catchment would be still available at the Cauvery Dam. If the Madras claim to all rare and uncertain floods, as they actually came in, in the past, is to be admitted, there will not be much scope for any progress towards a settlement. Such a claim would render Rule III of the Agreement of 1892 inoperative Besides, on an average, about 30 per cent of the yield at the Cauvery Dam admittedly goes to the sea; and Madras have not shown that they have been using it and they would not be justified in placing obstacles in the way of Mysore doing so.

PART IV.—PLACE OF MEASUREMENT OF SUPPLY DUE TO MADRAS.

Paragraph 14.—The Government of Madras claim that the flow of the river should be measured above the water-spread of Kannambadi Reservoir and at a selected site on the Kabbani. Allowances of 25 *per cent* for losses in transmission between Sivasamudram and the Upper Anicut are claimed during the south-west monsoon. The Madras discharge records of flow at Bhavani Bridge are reliable, except for high floods and discharges below 1,000 cusecs. This is stated in paragraphs 29 and 30, Volume III, Madras Cauvery Project Report.

The bed of the river at Bhavani Bridge is rocky and not liable to scour, and the discharges are reliable.

The statement that the discharges are unreliable is now made by the Mysore Government for the first time and they are put to the proof of this statement.

It is noted that Mysore admit that the discharges at the Cauvery Dam are reliable. Those at Bhavani Bridge are equally reliable.

The Mysore statement that the Bhavani discharges are incorrect was only to the extent now admitted by the Madras Government themselves, namely, that the "records of flow are reliable except for high floods and discharges below 1,000 cusecs." Correct *flood* records are a vital matter for purposes of the Mysore case.

REPLY OF MADRAS GOVT.

As regards the gaugings of discharge at Sivasamudram, a statement of these was furnished by the Durbar to the Madras Government, and put forward as accurate, except for flood discharges, as lately as the 31st March last, by the Dewan of Mysore in his letter No. 838—Pol. of 31st March 1913, paragraph 2, which runs as follows :—"With reference to paragraph "2 of the Madras Government letter, I "may point out that there are accurate "records of discharges both at Sivasamu-"dram and at Bhavani Bridge for more "than nine years."

These discharges have been used as the basis of arguments throughout the discussions which have taken place, and are the only basis of the Mysore proposals, so far as concerns the safeguarding of Madras supplies.

They have also been used as the basis of the Madras case as regards comparison of discharge records for computing losses in transmission and show that the occasional losses are great.

It is now stated that for gauging "high floods" the site is unsuitable, and this is admitted.

It is, however, also stated in contradiction of everything previously put forward that "the past records of gauge-"readings are unreliable." Such a statement appears to foreshadow a repudiation by Mysore of the discharges based on gauge-readings at Sivasamudram, that is, of all the discharges furnished to Madras, notwithstanding the Dewan's admission that these discharges were accurate except for high floods.

This sudden repudiation of gauge-readings as "not reliable" cannot be acquiesced in by Madras in view of the previous statements officially made by Mysore, that the discharges based on these gauge-readings are "accurate."

Paragraph 15.—The Madras claim is for a measurement of the flow of the Cauvery above Kannambadi, and on the Kabbani, with an allowance of 25 *per cent* for *net* loss in transmission during the south-west monsoon.

REJOINDER BY MYSORE DURBAR.

Mysore admit that they were under the impression that the records of discharges both at Sivasamudram and Bhavani Bridge were fairly accurate. But, on a recent examination of the figures, it has been found that the discharges at Sivasamudram were over-estimated, while those at Bhavani Bridge are admittedly under-estimated for floods. In these circumstances, the inference to be drawn regarding the transmission losses may be the very reverse of what is assumed by the Madras Government. That Mysore have all along been consistent in their arguments will be clear from their reiterated demand that whatever decision may be arrived at now should be put to the test for a period of 6 years by reliable observations made for the purpose.

It may be pointed out that some of the contentions of the Madras Government in this paragraph are obviously self-contradictory.

The Madras claim being based on incorrect discharges both at Bhavani Bridge and Sivasamudram, as admitted in their reply to paragraph 14 of the Mysore case, will require material modification as stated already. An examination may establish

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
In working on the system proposed by Mysore based on measurements at the Upper Anicut, losses in transmission on compensation water, passed to make up excess balances impounded by Mysore, will still be necessary.	a conclusion quite the reverse of that drawn by Madras.
The percentage in this case is, however, not the same, and 30 *per cent* on the quantity of compensation water would in such a case be required to provide for such loss.	Whatever losses there may be when small quantities of water are sent down a river or a canal for purposes of irrigation when the bed is likely to be dry, the additions to the waters of a river, for the compensation referred to, cannot suffer material losses in transmission, considering that impounding is done during flood time when the river has a fairly good flow.
Part V.—System of Regulation.	
Paragraph 16.—It is for Mysore to put before the Arbitrator the proposals and details of their project fully and clearly. So far as Madras is concerned, the most important item of the Mysore project, and the one which must be adjudicated on before all others, is the method of regulation.	The function of the Arbitration Committee in the present case is quite clear from clauses III and IV of the Agreement of 1892, *viz.*, to determine "the existence, extent and nature of such prescriptive right and *the mode of exercising it*" consistently with what is "fair and reasonable." Having regard to this provision, the contention of the Madras Government cannot be sustained.
It is for Mysore to state clearly and fully the system of regulation proposed for their project.	
It is not for the Arbitrator to "devise" the system of regulation of the Mysore project, but to adjudicate on the system proposed by Mysore, or in the alternative on the proposal of the Government of Madras, making such amendments in matters of details as may appear to him necessary.	
Paragraph 17.—It is denied that water ever passes from Kannambadi to the Cauvery Dam in one day, which is equivalent to a mean velocity of 14 feet per second or 9·66 miles per hour.	In high floods such as occurred in 1911, it is still believed that the velocity will be very high and that the time of flow will be nearer one day than two.
In saying that Mysore should be enabled to store all water "in excess of that to be given for irrigation at the Cauvery Dam," the Durbar ignores the obligation to supply the 95,000 acres of Madras irrigation above the Upper Anicut. This area alone is about 65 *per cent* of the area proposed to be irrigated under the Mysore project and is certainly not a negligible quantity.	The rules for regulation already put forward make it clear that due allowance is automatically made for the intermediate irrigation since the depths measured at the Cauvery Dam will represent the net supply after satisfying the needs of the irrigation above the Upper Anicut. This has been also made clear in paragraph 15 of the statement of Mysore case. The statement here advanced by Madras is clearly a misapprehension.
	It may be here stated that the area of intermediate irrigation was first given sa

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
	61,500 acres, and the same figure is also mentioned in the Metur Project, and recently it has been raised to 95,000 acres.
Mysore may suffer from the circumstance which fixes the site of their reservoir at so great a distance up the river from the bulk of the Madras irrigation, but this is no ground for adopting a remedy which would entail continuous risk of loss, and not infrequent actual loss, to Madras.	The system of measurement at the Cauvery Dam and the method of regulation already proposed by Mysore would be fair to both parties as all such alleged "not infrequent losses" can be effectively prevented. Due allowance would be made for all intermediate replenishment from the numerous tributaries flowing both in the Mysore and the Madras areas between the Kannambadi Reservoir and the Cauvery Dam.
Paragraph 19.—It is denied that, in a stage of river discharge which limits the maximum flow to a "depth of 6 or 7 feet" at the Cauvery dam, the mean velocity of flow is 7 feet a second (4·83 miles per hour), which is what is necessary for transmission of the supply in two days, and the Mysore Government are put to the proof of this.	The Mysore statement has not been correctly interpreted in this matter.
For the stages of flow which will rule when the Mysore Reservoir is under regulation, allowance for time of transmission which will fairly meet the circumstances of the case is considered to be 3½ days, and Madras is prepared to adduce evidence in support of this proposition.	The flow within Mysore territory is very rapid whatever it may be in Madras. The average assumed by Mysore is believed to be correct. But they have always favoured a period of test before the proposals are finally accepted.
The second part of this paragraph is not understood, but it is denied that in the months of July and August the local rainfall near the Cauvery Dam produce floods.	The local floods referred to related to the copious flow coming from the Bhavani and other streams producing floods in the south-west monsoon.
Part VI.—Proposed Regulation to be tentative.	
Paragraphs 20, 21 and 22.—The Madras Government most strongly oppose a tentative settlement. The demand that rules for regulation at the Mysore Reservoir and the water supplies to be passed to Madras should be settled now.	The Mysore Government agree that final settlement should, if possible, be arrived at on the present occasion. But as the data on which the Arbitrator has to form an opinion are admittedly insufficient and in some cases known to be incorrect, the decision should be subject to confirmation after a period of six years. This is as much in the interests of Madras as of Mysore.
Further, they demand full examination of the proposals for the larger project proposed by Mysore, and a decision regarding the refusal of assent by Madras to the proposals put forward. The Government of Madras press for a final decision as to whether the large reservoir proposed by Mysore may be built or not.	As regards the question whether the larger reservoir proposed by Mysore may be built or not, it is necessary to state that the question before the Arbitrator is not whether the reservoir should be large or small, or whether the reservoir should

REPLY OF MADRAS GOVT.

In the interests of Mysore as well as Madras a final settlement of this question is most desirable, so that it may be known definitely what dimensions are required for the dam at Kannambadi, on which work has already been commenced. The arbitration in progress has been ordered by the Government of India with a view to a definite and final settlement of the matters at issue. The Government of Madras demand that the decisions of the Arbitrator shall be a final and binding settlement of the questions involved.

The Mysore Durbar have had this project in view for many years. In his letter No. 869-Pol. of 27th March 1911, to the Resident, a copy of which was forwarded to the Government of India with the Resident's letter No. 2053-E. I. of 3rd April 1911, the Dewan states as follows: "For many years the Mysore Government "have intended to construct a reservoir "on the Cauvery for developing irrigation "in the valley."

It was obviously under such circumstances the duty of Mysore to make suitable gaugings and measurements of discharge during these many years, and to some degree they appear to have done so. It is not open to Mysore to claim postponement of settlement on the ground of the inaccuracy of such measurements, until now described by them as accurate. On most of the points to be decided, postponement for six years would not result in production of any more relevant or reliable facts, than will be now at the disposal of the Arbitrator, while *data* collected specially to prove one proposition or another would even, if sufficient, be open to suspicion.

On the matter of quantity of water to which Madras had in 1910 prescriptive right, evidence taken now must be better than evidence taken at the end of six years. Accordingly, a final and binding decision is pressed for.

In six years' time there will be little or no more information available as a guide to drawing up rules for fixing the system of regulation.

The matter of losses in transmission is, it is admitted, a complex one, but such

REJOINDER BY MYSORE DURBAR.

be built or not. The real question is what is the quantity of water available for impounding in Mysore after satisfying the prescriptive right of Madras already acquired and actually existing. This aspect of the case cannot be too strongly emphasised.

Mysore do not admit that any further information to be collected will be open to *suspicion.*

There is no objection to the settlement of the prescriptive right now; but any hydraulic Engineer of experience will bear out the view of the Durbar that such large questions connected with regulation of supplies cannot be settled finally without a correct observation of discharges and collection of the necessary data.

The principles of regulation may be settled now and their application also provisionally; but a final confirmation should be deferred till their efficacy is duly tested.

REPLY OF MADRAS GOVT.

losses can only be computed on consideration of the results of bad years. The nine years, regarding which gaugings are available, include three bad years, and it is improbable that a period of six years would give better information in this respect.

The Government of Madras ask for decisive, final, and binding decisions on the points at issue.

PART VII.—NO OUTSIDE INTERFERENCE WITH DISTRIBUTION OF WATER.

Paragraph 23.—The Government of Madras claim no right of interference with the "internal distribution" of water in Mysore Territory, meaning by this the distribution of the water to the enjoyment of which it is decided that Mysore has a title.

The Government of Madras do, however, insist on their right to such limited interference as may be necessary to secure that the rules for the regulation of impounding in and issues from Kannambadi reservoir are duly observed.

The Government of Madras, however, claim that full detail of the scope and character of the project proposed by Mysore shall be communicated to them and laid beforethe Arbitrator.

The points on which information is required in addition to what is included in the printed book describing the Mysore project are noted below:—

(*a*) A statement of the proposed half-monthly "draw-off" for all irrigation channels taking off from the reservoir.

(*b*) A statement of the proposed half-monthly "draw-off" of each of the Mysore channels below the dam existing or proposed which will be fed from water issued from the reservoir sluices.

REJOINDER BY MYSORE DURBAR.

The principles stated in the first two clauses are fully accepted by the Mysore Government provided that, after once the supplies due to Madras according to prescriptive right are settled, the Madras Government undertake to give full particulars whenever their irrigation is extended, necessitating additional draw-off from the river.

(*a*) A rough statement as far as it could be compiled at this stage, has been already supplied (*vide* No. 239, dated 10th September 1911, from the Dewan to the Hon'ble the Resident in Mysore).

(*b*) Existing irrigation below Kannambadi Dam for which no regular draw-off tables are maintained amounts to about 40,000 acres. Due allowance will be made in the calculations for discharge through the sluices for any increase in this area.

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
(*c*) A "duty table" showing draw-off per acre proposed half-month by half-month for the channels - (i) taking off from the reservoir ; (ii) taking off below the reservoir and fed from the reservoir sluices.	(*c, d & f*) This information will be supplied before addditional irrigation is actually begun.
(*d*) Statement of areas, and seasons of "draw-off," as regards each of the above channels separately stated with respect to— (i) Monsoon crop. (ii) Dry season crop. (iii) Crops requiring perennial supply.	
(*e*) Areas and details of any proposed extension of irrigation above the reservoir, rendered practicable by supplying existing irrigation below the reservoir from it.	(*e*) According to the terms of 1892, Mysore has full freedom to extend irrigation by anicuts unless such irrigation is directly fed by a reservoir.
(*f*) The maximum discharge which each new channel taking off from the reservoir is to be designed to carry.	
(*g*) Rules for regulation of the reservoir regarding issue of water to Mysore irrigation and restrictions imposed so as to absolutely secure an uninterrupted full supply to the power installation.	(*g*) Mysore reserves full power to alter the quantaties issued for power or irrigation according to the relative exigencies of demand.
(*h*) Full details of allowance made for reduction in reservoir capacity by deposition of silt, and of the number of years it is computed such allowance will enable the original effective capacity to be maintained unimpaired.	(*h*) This is not a matter in which Madras is concerned.
(*i*) Tables of daily discharges past Kannambadi as such are necessary for investigating the effect of the Mysore "Rules for regulation of the Reservoir" on the Madras existing irrigation.	(*i*) Daily discharges based on actual daily gauging at the dam site are not available. But fortnightly discharges calculated from the gauge readings, available, have been supplied, with full details explaining the methods of computation.
Full details of the methods of computation of the discharges and data on which these tables are based should be furnished, the details being sufficient to enable all such computations to be verified by Madras officers and by the Arbitrator.	

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
(*j*) The Durbar should also furnish full engineering particulars concerning the dam, its sluices, surplus works and all works which may affect Madras, and designs of the same.	(*j*) All that is really needed is given in the printed project already.
As regards the last lines of the Mysore statement, paragraph 23, it is not clear to what restrictions Mysore is referring.	
As already stated, the Madras Government do not wish to interfere with the distribution of the water which Mysore may be held by the Arbitrator to be entitled to use.	
As regards the construction of reservoirs or other irrigation works. Rule VI of the Agreement of 1892 imposes on Madras similar restrictions with reference to streams flowing through Madras territory into Mysore.	The restrictions as per agreement are really effective only as against Mysore. Mysore being generally a table-land situated on a higher level than Madras, the restrictions against Madras in the agreement are merely nominal.
Part VIII.—Supply due to Mysore.	
Paragraph 24.—The statements in this paragraph are irrelevant to the matter at issue.	The statements are relevant to this extent, *viz.*, that Mysore cannot submit to restrictions while Madras is left free to extend its already disproportionately large irrigation. No agreement can be considered equitable which enforces obligations and restrictions on one party, while the other is not only not hampered but is left free to extend its prescriptive rights.
Part IX.—Creation of new Prescriptive Rights undesirable.	
Paragraph. 25.—The statements are irrelevant.	The relevancy has been pointed out in the rejoinder to the previous paragaph.
Paragraph 26.—The Government of Madras entirely repudiate the suggestion put forward in the first two lines.	It has already been pointed out in the rejoinder to paragraph 20 above that the agreement is one-sided as it leaves Madras free to do what it likes in the way of irrigation extensions which will eventually tend to render all future extensions in Mysore impossible. The Mysore Government have therefore specifically raised an issue on this matter for decision by the Arbitration Committee.
Paragraphs 25 and 26 introduce matters which are altogether outside the scope of the present reference and should therefore be dismissed from consideration.	
Part X.—Other points for consideration.	
Paragraph 27.—The Government of Madras claim that no infringement what-	Mysore has no intention of infringing the existing prescriptive rights of Madras;

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
ever of Madras existing rights shall be permitted.	but they are most anxious that the Madras Government shall not be allowed to indefinitely trench upon their natural rights to the use of water in their own territory.
Paragraph 28.—The statement made is denied.	This statement is based on a communication from the Joint Secretary (Irrigation) to the Government of Madras dated the 12th November 1910 to the Hon'ble the Resident; extract from which runs as under:— "Also, as the British Cauvery project is completely worked out and just about to be submitted to the Government of India, the Madras Government desire, before submitting it, to know the probable effect of the Mysore project upon it."
Paragraph 29.—The fact that Madras may possibly construct a reservoir at Metur hereafter is wholly irrelevant to the arbitration.	
The Madras Government deny that the construction of such a reservoir would afford just ground for reducing the amount of water to which they are now entitled.	The reason why Mysore claim a modification in their favour when the Metur Reservoir is constructed, is that the conditions under which the prescriptive right is claimed will be changed. Madras is entitled to the supply of water for its existing irrigated area, and when a reservoir comes to be built, this supply would naturally be less than what it is under the present conditions.
The Madras Government have full liberty to deal as they please with the water to which they have a prescriptive right, and it cannot for a moment be admitted that the Mysore Durbar has any right to benefit by works constructed by the Madras Government. Moreover, construction by Madras of works on the Cauvery below the Mysore frontier is not covered by the Agreement of 1892 and is wholly irrelevant to this arbitration.	
Paragraph 30.—It is denied that the flowrealised in the month of June up to the limit of flow claimed is "mostly allowed to run into the sea." In the Madras Cauvery Project, to which reference is given, the remarks alluded to are made by a revenue officer who had not access to the water registers and who qualified the whole paragraph with the initial remark, "I have heard it said."	This denial is contradicted by the following extract taken, not from a Revenue Officer's statement, but from one made by Col. Ellis, Special Superintending Engineer, in charge of the Madras Cauvery Reservoir Project:— "The seed beds are usually watered "either by early freshes in the river or "water is obtained for them by baling "from wells or spring channels. Any "water in the river in excess of what is "necessary for the seed beds before the "time of transplantation *generally runs* "*to waste* as the ryots object to using it "on their fields or wetting them until

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
	"just before transplantation. They prefer the ground to remain dry and get "thoroughly ærated." .
	And Col. Ellis proceeds to say in the next paragraph that transplanting the double crop area of only about 90,000 acres is taken up after the early freshes which generally commence on the 18th June and that transplantation in the single crop area of about 900,000 acres is taken up in July or August.
	The remark "I have heard it said," attributed to a Revenue Officer, applies to quite a contrary statement. The passage establishes that the early freshes in June are really wasted as stated by Mysore.
Paragraph 31.—This appears to be a plea to respect the prescriptive rights of Madras in certain years when water is plentiful, and to ignore them in bad years. The Madras Government altogether repudiate such a suggestion, and insist that Mysore must be bound by her obligations to respect Madras prescriptive rights throughout every year, no matter what its character.	The Durbar wish to repeat that it is nowhere usual in designing such reservoirs to limit their capacity to the yield of the worst years only. Also, it must be clearly stated that when once the rules for regulation are framed with due reference to the prescriptive right of Madras, they will be strictly adhered to, whether in good or bad years. The Durbar repudiate the insinuation here made by Madras.
Part XI.—Terms of Reference and Conclusion.	
Paragraph 34.—The statements in this paragraph are irrelevant.	The Durbar wish to bring to the notice of the Arbitration Committee that the existing irrigation rights enjoyed and the rights conferred by the Agreement of 1892 are unduly favourable to Madras at the expense of Mysore.
Should the Government of Madras undertake the construction of a reservoir on the Cauvery, such construction will in no way diminish their prescriptive rights, or their title to whatever water may now be decided to be justly due to them.	
Paragraph 35.—Sufficient reasons for refusing assent to the Mysore Reservoir have been given to the Government of Mysore with original refusal. The further reasons subsequently put forward strengthen the Madras case.	
The Government of Madras believe that they have furnished ample justification of their refusal to assent to the construction of the proposed work.	
If the water to which they are entitled is passed down, there is strong reason to believe, from the data so far available, that the Mysore project must fail,	The Government of Mysore are fully satisfied that their reservoir project will not fail if proper arrangements are made for storing water not required by Madras by prescriptive right.

REPLY OF MADRAS GOVT.

and the Durbar should therefore not be allowed to carry it into execution.

The existence of such a work would be a serious menace to the Madras irrigation of over one million acres, since in years of short supply there would be risk of a breach of the rules for the regulation of impounding, owing to the pressure which is bound to be brought to bear on those controlling the impounding.

CONCLUSION.

The Government of Madras do not admit any statement in the Mysòre case which has not been expressly admitted above.

REJOINDER BY MYSORE DURBAR.

The statement that the Mysore Government would allow a breach of the rules under pressure or otherwise is wholly unwarranted. When a decision is finally accepted by them, the Durbar are fully resolved to carry out their share of obligations to the letter.

CONCLUSION.

The considerations set forth in the rejoinder but strengthen the following conclusions and recommendations in the original statement of the Mysore case :—

(1) The first question for the Arbitration Committee to decide is the prescriptive right of Madras, *i.e.*, the area of irrigation which is entitled to a supply from the river.

(2) The second question is the determination or fixing of the depths of water required in each fortnight or month for the existing irrigation to which Madras may be considered to have a prescriptive right as in (1) above.

(3) The third point is the manner in which the river supply should be controlled and regulated to secure the supply due to Madras, as determined by (1) and (2) above, while affording facilities for impounding the remaining river supply in Mysore.

(4) The fourth point is to consider for what period the decision under (3) above should be tentative for purposes of verifying the data on which the decision may be based.

The Mysore Government earnestly hope that the decision of the Arbitration Committee may, as far as practicable, have the vital element of finality. The rules defining the respective rights should be simple and effective, and framed on broad lines, so that opportunities of friction and disagreement between the two Governments in the future might be minimised, or avoided altogether, and that each party may be left unfettered to develop its natural resources.

If, in this view, it be found necessary to modify the Agreement of 1892, the Arbitration Committee should not, it is submitted, hesitate to suggest and recommend the necessary modifications in that document.

Reply of Madras Govt.	Rejoinder by Mysore Durbar.
Reply of Madras as regards "Provisional rules for working the Mysore Reservoir" handed in to the Arbitration Committee on 26th July 1913, (Exhibit My. 2.)	
1. The Madras Government cannot assent to the proposals in paragraph 1 of the Mysore rules. The flow limits at the Cauvery dam which Mysore suggest as the supply which will satisfy the existing prescriptive rights of Madras are altogether inadequate and do not give to Madras irrigation a supply even approaching in volume that admitted by Mysore to be reasonable in paragraph 10 of the "Statement of the Case for Mysore."	1. This has now been fully explained in the Rejoinder against paragraphs 3 and 4.
2. The system of control of regulation described in the Mysore rules 2, 3, 4, 5, 6, and 7 is exactly similar to that proposed by the Dewan of Mysore in his letter No. 11-Camp of 10th May 1912 (Exhibit Ma. 1-*a*) alluded to in the Madras Statement of Case (Exhibit Ma. 1) with the exception that the limit supplies, instead of being 26,700 cusecs, are as shown in paragraph 1 of the new rules, while the period during which Mysore is to be permitted to impound all flow is now fixed as commencing on the 1st February instead of on the 1st March as proposed in the previous rules above specified. Both these deviations are open to still greater objection than the rules originally proposed. These rules are as regards Madras supplies much more unfavourable than those referred to and rejected in the Madras statement (Exhibit Ma. 1), and cannot, for reasons already given in Exhibit Ma. 1, be accepted by Madras.	2. These objections have been fully explained in the Rejoinder. The change from 1st February to 1st March in the rules of May 1912 was made by Madras.
3. The effect of paragraph 8 of the rules is to give to the Mysore Officer in charge of the works at Kannambadi extensive discretionary powers to depart from the rules for impounding. The Madras Government object to any discretionary power being given to deviate from any rules which may be decided on for ensuring the passing of suitable supplies to Madras.	3. The discretion extends only to the quantity that is available at the Kannambadi Reservoir site and one of the effects of the telegraphic communication would be to prevent excess storage, a factor favourable to Madras. No deviation from the rules will be allowed.

REPLY OF MADRAS GOVT.

4. In addition to the objections above stated, the rules are considered impossible to work either smoothly or efficiently and are also open to the other objections set forth in the reply of Madras to the Mysore statement of their case (Exhibit My. 1) submitted on the 21st July.

(Sd.) W. M. ELLIS, COL., R.E.,
Representative of the Government of Madras.

REJOINDER BY MYSORE DURBAR.

4. All this is fully answered in the Rejoinder.

Exhibit Ma. 4.

ENQUIRY INTO THE PROJECT FOR A RESERVOIR ON THE CAUVERY PROPOSED BY THE MYSORE DURBAR.

Rejoinder of the Madras Government to the Rejoinder presented by Mysore on 4th August 1913.

[NOTE.—*The parts and paragraphs referred to are those in the Mysore statement of the case.*]

PART II.

Paragraphs 3 *and* 4.—(1) The Madras Government deny that any prescriptive rights acquired by them prior to the remodelling of the Upper Anicut could in law be cut down in extent by the reconstruction of that work or any economies which they may have been able to effect in the use of water.

Any such voluntary economies cannot constitute an interruption or non-enjoyment of the kind required to affect a prescriptive right.

(2) The Government of Madras further deny that it is not open to them to prove the completed acquisition of a prescriptive right prior to the remodelling of the Upper Anicut or that they are restricted to proof of enjoyment of the quantities claimed subsequent to 1890.

(3) With reference to the claim of the Madras Government, under II (iv) of the Madras reply, for a continuous flow of 900 cusecs in the months of March, April and May, it is pointed out that the Mysore Government have throughout the discussions and correspondence represented that all the water passed for power generation throughout the year would be passed down the river to Madras. It is only under such understanding and on such conditions that the Madras Government consent to waive their existing right to the whole natural flow of the river during the months of March, April and May.

The project put forward by Mysore provides for passing for power a steady flow of 1,000 cusecs, and this should be passed down the river to Madras.

In the claim made, this flow has been reduced to 900 cusecs to allow a working margin.

To such an arrangement it was believed that Mysore Durbar agreed and it was one of the points on which it was understood there was no divergence of views. If Mysore deny the right of Madras to the flow of 900 cusecs throughout the months of March, April and May, the Government of Madras claim in alternative throughout this period the whole natural flow of the river up to the limit stated in II (i), Madras reply.

PART III.

Paragraph 10.—Mysore Government made a reasonble admission which they now propose to withdraw. There appears to the Government of Madras only one meaning which can be attached to the admission in paragraph 10 of the Mysore statement. The meaning now advanced by Mysore Government would have the effect of reducing the supplies to be passed at the Cauvery dam to a quantity far below that allowed in the Metur Project. It is not clear how this can have been the intention of the Mysore Government when saying "an addition of 25 to 30 *per cent*" of the *supplies provided in the Metur Project* should be sufficient" (*vide* paragraph 10 of Mysore statement).

Proof will be adduced that the explanation now given entails great reduction of the "*supplies provided in the Metur Project.*"

PART IV.

Paragraph 14.—The Government of Madras accept the admission of Mysore that the Bhavani Bridge discharges are incorrect only to the extent stated in the Madras Cauvery Project Report, paragraphs 29 and 30, Volume III.

PART VI.

Paragraphs 20, 21 *and* 22.—The Government of Madras emphatically deny the contention of the Mysore Durbar that the question before the Arbitrator is not whether the reservoir should be large or small or whether the reservoir should be built or not but what is the quantity of water available for impounding in Mysore after satisfying Madras rights.

Under Rule IV of the Agreement of 1892, it is only a concrete case that can be the subject-matter of reference to arbitration and not the mere abstract question how much water is available after satisfying the rights of Madras.

In view of the language of Rules II and III, the case referred to in Rule IV can only be whether any particular new irrigation reservoir may be built or not and whether the Madras Government are bound to assent or not to such a work.

The whole correspondence between the two Governments also shows that the Mysore Durbar have been seeking the consent of the Madras Government and that the latter have been refusing to consent to the execution of the bigger project.

The issue as to how much water is needed for Madras requirements is only subsidiary to the main issue in the case, which is whether the particular project proposed should be allowed to be executed.

This subsidiary issue cannot dispense with the adjudication of the relief claimed by Mysore, whether the Madras Government are bound to consent to the construction of the large reservoir she has proposed.

If Mysore now says that she wants no such relief, the case before the Arbitrator must drop.

Under agreement Mysore has no right to ask for any adjudication except with reference to some specific project in hand.

PART VII.

Paragraph 23.—The replies to items (*e*) to (*h*) amount to a refusal to give the information called for.

The Government of Madras claim that full information regarding the Mysore Project shall be given to them and laid before the Arbitrator.

Although on some of the points on which information is asked the Madras Government have no right of interference, it is claimed that they have the right to demand and receive from Mysore full information regarding the project put forward by the Mysore Durbar and to which they have refused to give assent pending the furnishing by the Durbar of full details.

It is urged that neither the Arbitrator nor the Government of Madras can fully consider the matter under enquiry unless the particulars asked for are disclosed by the Mysore Government.

Under (*e*), the information asked for materially affects Madras supplies of water and any extension of irrigation due to the proposed reservoir is a material portion of the project and particulars and details of such extension must be furnished.

Regarding item (*j*), the Government of Madras deny that all necessary engineering particulars as regards the proposed works have been furnished. The particulars required should contain sufficiently full engineering details to enable a judgment to be formed on the soundness of the engineering designs and proposals.

So far only mere outlines of proposals have been furnished and the Government of Madras repeat and press their previous demand.

PART X.

Paragraph 29.—The Madras Government urge that their prescriptive right extends to all the flow in the river which they have customarily enjoyed and which is necessary to ensure the full customary supply to the existing irrigated area and that it cannot be curtailed with reference to conditions and economies brought about by any irrigation works already constructed or hereafter to be constructed by them. The internal distribution of the flow to which the Madras Government have acquired a prescriptive right and the manner of enjoyment of that flow are matters with which Mysore has no concern.

Note.—This also constitutes a reply to "Conclusion", sub-clause (1), of Mysore rejoinder.

PART XI.

CONCLUSION.

Reference to sub-clause (1)—*vide* reply under paragraph 29.

Sub-clause (2).—The Madras Government contend that the question for the determination of the Arbitrator is the depth of flow hitherto found necessary by the Madras Government to give an adequate supply and not what is, in the opinion of the Arbitrator, required for such irrigation irrespective of past user.

The Government of Madras do not admit any statement in the Mysore rejoinder which has not been expressly admitted above.

W. M. ELLIS, COL., R.E.,

Representative of the Madras Government.

Exhibit Ma. 5.

Suggested Terms of Reference by the Madras Government.

(1) In what manner and at what point or points shall measurement be made of the discharge of the Cauvery to guide the regulation of the supplies which must be passed down to Madras before impounding in Kannambadi Reservoir is allowable?

(2) What is the quantity of water to which Madras is entitled under the Agreement of 1892 to fully safeguard her existing rights and interests both above and below the Upper Anicut and which should, during the different months of the year, be passed down by Mysore before impounding in Kannambadi Reservoir?

(3) Does the decision as regards the foregoing and other points covered by the Agreement of 1892 justify the continued refusal of Madras to assent to the construction of the reservoir projected by the Mysore Durbar; and, if not, what rules and restrictions as regards measurement of flow, means to ensure and agency to supervise the passing of supplies to Madras, draw off and area irrigated, engineering details and other points, should be made conditions of giving assent?

W. M. ELLIS, COL., R.E.,
Representative of the Madras Government.

5th August 1913.

Exhibit Ma. 6.

A protest by Madras regarding information required of Mysore.

In the "reply of the Government of Madras," Exhibit Ma. 3, paragraph 23 (*g*), a request was made to be furnished with "Rules of regulation of the Mysore Reservoir as regards issue of water for irrigation." The Assessor has ruled in his letter No. 38-I.G. of 16th September 1913 that this is a matter which does not concern Madras.

The reconsideration of this decision is respectfully pressed on the Arbitration Committee.

2. There are two reasons why it is necessary to know the rules of regulation—

First, in order that the Government of Madras may be secured in the undertaking to be made by Mysore to pass down the river to Madras in the hot season a certain steady supply. It is only on being satisfied that the Mysore working system is such as to ensure the passing of this down that the Government of Madras consent to waive their right to the full natural flow of the river in the months of February to May.

Second, in order to enable the working conditions of the Kannambadi reservoir to be investigated by working tables drawn out on the basis of the rules, it is necessary to know what the rules are. Without rules, it is quite impossible to draw working tables properly.

3. It is not suggested that the rules should in all respects be permanently binding on Mysore but they should form the basis on which the working of the reservoir is to be examined.

4. The conditions of the Mysore reservoir are such as preclude the adoption of a system of issue of full seasonal supplies steadily to the full area so long as these supplies last.

The conditions appear to render it absolutely necessary to always maintain sufficient water impounded in the reservoir to *absolutely secure the supply for power.*

The agreement with the mining companies makes this necessary and further the liability to Madras for a steady hot weather flow also makes it necessary if Mysore wish Madras to waive their rights to the full natural flow in this season.

Thus the power supply must be absolutely safeguarded from failure.

To do this, it is necessary to frame rules defining under what circumstances and conditions supplies passed to irrigation are to be restricted and to what extent.

5. The duties and draw-off to which Madras have been referred as representing the Mysore proposals presuppose that there will be an abundant supply and total absence of any failure to pass full supplies. The preliminary tables prepared by Madras do not foreshadow that such condition of affairs can be maintained in bad years.

6. What is required is to be told what rules and restrictions will be imposed on irrigation draw-off to secure water for power. It is not to be imagined that a system of regulation will be adopted which will continue full "draw-off" when the conditions of supplies are such as to entail imminent risk of failure for power supply.

The drawing up of suitable rules is not a matter of great difficulty; indeed the problem is very similar to that in the Madras "Kistna Reservoir Project." In that project, the conditions make it essential to have without failure and at all costs a certain balance of water in the reservoir for seed-beds on the 1st June yearly and the rules of regulation drawn up with the project are such as will secure this.

What is asked of Mysore is similar suitable working rules so as to enable an examination of the working of their reservoir to be made.

7. In default of such rules, detailed instructions are asked from the Arbitration Committee as to the method on which working tables for the Mysore reservoir are

to be drawn and will be accepted as a correct representation of working conditions and what, if any, restrictions are to be placed on the full "draw-off" when the conditions of the reservoir appear to require such restrictions.

8. It is submitted that under the fourth term of reference the Arbitrator has explained that the fullest examination into working of the proposed Mysore reservoir is contemplated.

Without rules of regulation regarding the "draw-off" for Mysore irrigation no such examination can be made and the Arbitrator must decide whether the Madras contentions and objections to the Mysore reservoir are justifiable without knowing what the working conditions and prospects of the Mysore reservoir are.

9. Madras have refused to consent to the construction of the Mysore reservoir on the ground that a successful reservoir scheme on the lines proposed by Mysore is incompatible with the passing to Madras of the water which will fully secure her existing rights and interests. The position of the Mysore works is such as to render it possible under conditions implying scarcity, inadequate supply and failure in Mysore wholly or partially to redeem the situation by impounding water to which Madras has prior rights. Not only is this possible but the circumstances accompanying such a state of affairs would be such as to subject the controlling staff to the greatest pressure to induce them to act in such a manner. Under these circumstances of the case, it is a reasonable assumption that if the conditions of working the reservoir are such as to entail frequent deficiency of supplies accompanied, as it would always be, with the power to end this by improperly impounding water, the risk to Madras interests and rights would be very great and that in the protection of these rights Madras is justified in refusing assent to the proposals of Mysore for construction of a project, the failure of which under conditions which safeguard Madras interests is clearly foreshadowed. It is not contended that a single failure in a long term of years would justify such a refusal, but it is contended that frequent minor failures or less frequent serious failures would be a justification of such refusal.

10. It is not intended to suggest that the Mysore Durbar have been deliberately proposing to build a reservoir which can only be successful through the appropriation of water to which Madras has rights.

The Durbar have been informed and led to believe, whether rightly or wrongly remains to be shown, that there is plenty of water to make the Mysore scheme successful while fully protecting and safeguarding Madras rights.

Further, it is believed that the Mysore Engineers were also of this opinion, and have originally advanced their scheme in good faith, and in the belief that it was quite possible to impound all the supplies required without detriment to Madras.

On the incomplete and inaccurate data and records of discharges, and on the optimistic assumptions made by Mysore Engineers, such an aspect was displayed in the descriptive papers regarding the Mysore project. The Madras contentions, also made on insufficient data (although the best available), put a different aspect on the question, but one the accuracy of which is denied by Mysore.

11. It is the contention of Madras that it is for the Arbitrator with the assistance of the Assessor carefully to examine the working conditions of the reservoir and have as accurate a forecast of these conditions as it is possible to make before coming to a decision on the point at issue which is whether the refusal of assent to the construction of the proposed reservoir is justified.

12. In order to make such an examination of the working conditions the working rules must be stated and form the basis of the computations to be made and Madras press for a statement of such rules—either by Mysore or by the Arbitrator. It is only after the working conditions have been examined with the aid of working tables based on the water supplies to which Madras rights are established and on the working rules which are pressed for, that Madras can formulate their views and arguments regarding the same.

13. When the fourth issue was framed the Arbitrator assured the Madras Representative in reply to his enquiry that the form in which it was drawn was intended and designed to include in its scope the fullest examination of the working conditions and engineering aspects of the proposals and it is submitted that, in the absence of working rules, the working conditions cannot be fully examined.

Further, it is to be fully understood that the Government of Madras altogether decline to waive their claims to the natural hot weather flow of the Cauvery (February to May inclusive) except under working rules which fully secure the uninterrupted flow of not less then 900 cusecs throughout these months and insist that the working rules so far as they shall affect such security shall be fully binding on Mysore.

14. If Mysore decline to put in such rules, the Government of Madras claim their full prescriptive rights to water all the year round.

15. Another point on which reconsideration is solicited is in regard to the view of the Assessor expressed in letter No. 38-I.G. of 16th September 1913 with regard to furnishing the information asked of Mysore in the Madras reply (Exhibit Ma. 3, paragraph 23-*d*).

This asks for areas irrigated and reasonable "draw-off" separately with respect to—

(i) channels taking off direct from the reservoir.
(ii) channels taking off below the reservoir and supplying areas fed from the reservoir.

The assessor has stated that this information does not appear to be necessary for purposes of this investigation.

The only information available on the subject of "draw-off" from the reservoir for Mysore irrigation is "total draw-off" for each day or half month.

A study of the conditions will show that the effective capacity of the reservoir is taken as the capacity down to cill level of the head sluice of the canal taking off from the reservoir.

It will be clear that, if the canal full supply level is say 7 feet deep and hot weather supply 3 feet deep, supplies can only be passed down with the reservoir water at a level not less than say 7¼ or 3¼ feet above cill, and an automatic and involuntary restriction of supply comes into play. This restriction, however, does not apply to irrigation supplies to be passed through channels taking off below the dam.

The above reasons make it clear that, for purposes of constructing working tables and investigation of conditions and prospects of working of Mysore reservoir, separate figures for "draw-off" from the channels—

(i) taking off from the reservoir,
(ii) taking off below the reservoir

are necessary.

It is urged on the above grounds that the Assessor should be pleased to reconsider his instructions in this matter.

16. Failing this, it is asked that instructions should be given regarding what assumptions should be made and will be accepted in working out tables in which the above considerations form factors which must be considered.

17. As regards the above matters, attention is further invited to the Agreement of 1892 between Madras and Mysore in which it is laid down that "full information regarding the proposed work" shall be furnished to the Government of Madras.

It is submitted that, under this agreement, the Government of Madras have a right to demand information regarding such vital considerations as "draw-off" and "system of regulation."

The information on all important points is under the agreement to be given to Madras and these points are not restricted to those to which it is within the province of Madras or of this arbitration to object. The system of internal regulation and distribution of proposed irrigation is not a matter with which Madras claim, subject to the safeguarding of her interests, any right of interference but she does claim a right to information which, under the agreement, should be given to her, and without which neither the Madras Engineers, nor any Engineer, however expert he may be, can make a really efficient examination of the conditions of water-supply and working prospects of the Mysore project.

W. M. ELLIS, COL., R.E.,
Representative of the Government of Madras.

Exhibit Ma. 6-a.

Letter No. 262-0—13-9, dated the 9th September 1913, from the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch), to M. Nethersole, Esq., Inspector-General of Irrigation, Simla.

I am directed to forward herewith a copy of letter No. 55, dated 6th instant, from Colonel W. M. Ellis, R.E., Superintending Engineer on Special Duty, on the subject of information called for from the Mysore Durbar, and to request that you will be pleased to arrange with the Durbar for furnishing the information not yet supplied at the earliest date possible.

2. A copy of this letter and enclosures is being sent to the Hon'ble the Resident in Mysore.

Enclosures.

(i)

Letter No. 55, dated the 6th September 1913, from Colonel W. M. Ellis, R.E., Superintending Engineer on Special Duty to the Chief Engineer for Irrigation.

I have the honour to address you on the subject of information called for from Mysore and the way in which the non-receipt in reasonable time of such information hampers the preparation of the Madras case.

* * * *

3. A list is enclosed showing in brief the information awaited and the occasions and dates on which this information was asked for.

* * * * *

7. It may be specially pointed out to the Assessor that the information asked in items IX and X is required in connection with the enquiry regarding the proportionate discharge of the Kannambadi catchment in relation to other parts of the catchments and that the early furnishing of this information was promised by the Mysore representative when the matter was discussed at Kannambadi.

(ii)

Date of applying for information through Arbitrator or Assessor.	Brief statement of the nature of information asked.	Remarks
*	*	*
XI. Formally asked for orally in the presence of Assessor at meeting at Kannambadi on 12th August 1913. Also promised at arbitration proceedings on 6th and 7th August at Bangalore.	(1) As regards replies to Madras Exhibit Ma. 3, paragraph 23, sub-paragraphs (*a*), (*b*), (*c*), (*d*), (*e*), (*f*), (*g*), (*h*), whether the Mysore Government formally adhere to the total "draw-off" and duties and distribution of draw-off for their project to the figures given in Mr. Visvesvaraya's working tables of 10th September 1911 and, if not, what draw-off, duties, etc., are proposed. (2) Statement of Mysore Government as to the maximum discharge capacity of the canals taking off from their reservoir as proposed. (3) If the silt computations already communicated to the Madras Government are those still adhered to for the purposes of the Mysore project. (4) A statement of the areas of extensions of irrigation on the Cauvery and its tributaries above Kannambadi proposed by Mysore Government.	After discussion at meeting of 6th August it was decided that binding replies to Madras enquiries must be given. The Mysore representative put forward replies indicated but promised to consult his Government before giving these in writing. The promise was again made in meeting of 7th and again at Kannambadi in meeting of 12th. The Assessor promised to endeavour to get a reply made on 15th before he left Bangalore. No reply given to date.

Exhibit Ma. 6-b.

Letter No. 38—I.G., dated the 16th September 1913, from M. Nethersole, Esq., Inspector-General of Irrigation and Assessor, Madras-Mysore Arbitration, to the Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

I am in receipt of your letter No. 262-0/13-9, dated the 9th September 1913, and with reference thereto have the honour to point out that a part of the information called for in Madras Exhibit Ma. 3, paragraph 23, and the other information referred to in the last clause of the list furnished with Colonel Ellis' note of 6th September 1913, have been supplied with Mysore Government letter No. 1134/7522, dated the 6th September 1913, a copy of which was sent to me by Mysore. I note, however, that the information is not quite complete. Items (*a*), (*b*), (*c*) of paragraph 23 may be taken to be covered by the reply given in the memorandum forwarded with the Mysore letter above referred to. Items (*d*) and (*f*) appear to me to be difficult, if not impossible, to comply with at the present as it is known that the Mysore draw-off channels have not yet been designed, nor do I think that it is necessarily essential to the arbitration. Item (*e*) appears to be complied with in the statement accompanying the same letter. Item (*g*) appears to me to be a matter for Mysore and I do not think it necessarily affects the arbitration. Item (*h*) is met in the reply given in the Mysore memorandum referred to. Item (*i*) was dealt with in my memoranda on inspection and I trust that Mysore will expedite the supply of the information as early as possible.

With regard to the other information called for previously and not yet supplied as detailed in Colonel Ellis' memorandum, I am asking Mysore if they will kindly inform me how far the preparation of the information which obviously will take some considerable time has advanced and when they will be able to supply it.

Exhibit Ma. 6-c.

Note by Assessor on the protest put in by Madras, Exhibit Ma. 6.

In reference to the protest put in by the Madras Representative (Exhibit Ma. 6) against certain passages in my letter No. 38-I. G. of 16th September 1913, I would point out firstly that no rulings were given in that letter in the sense in which it has been read by Madras.

In referring to item (*g*) the words used by me are as follows:—

"Item (*g*) appears to me to be a matter for Mysore and I do not think that it *necessarily* affects the arbitration." This is clearly not a ruling but an expression of opinion as to the relevancy to the arbitration of the information called for and obviously left it open to Madras to repeat their call for the information if they still considered it essential.

There is an obvious and reasonable inference to be drawn from the fact already before the Arbitration Committee that the primary object of the Mysore storage is to augment and secure their supply for power, and that this would therefore necessarily take precedence of the use of the storage for irrigation. Moreover so far no specific evidence has been put before the Arbitration Committee in support of any claim of Madras to prescriptive right as against Mysore to all the hot weather flow in the river, and, in its absence, as stated in my letter, I am doubtful whether this question of the hot weather supply is in any sense material to the arbitration. If, however, further evidence on this point is to be put in by Madras, it will, of course, receive due consideration.

The other point is in reference to Ma. 3, paragraph 23 (*d*). The words I used are as follows:—

"Items (*d*) and (*f*) appear to me to be difficult, if not impossible, to comply with *at present* as it is known that the draw-off channels have not yet been designed, nor do I think that it is *necessarily essential* to the arbitration." I might have added to the word "designed" the words "or surveyed" and it is perfectly certain

that, if the information based on actual channel details is essential to the arbitration at this stage, proceedings would have to be postponed for at least twelve months until those details could be furnished. Thus it appeared to me that the information really essential to the arbitration could be presented by Mysore in the form of average draw-offs to which they would be bound to restrict themselves and to fit which they would subsequently design their channels, and that this would obviate the necessity of calling for the detailed data which it was well known were not available and would take much longer to collect than the time available when the information was called for by Madras.

It is of course accepted that the Mysore rules for working the reservoir must be framed with due regard to their existing irrigation below the reservoir as well as to the supplies required for new irrigation, that is to say, it must be made clear that any proposed extensions to irrigation from existing channels both above and below the reservoir are included in the total new irrigation it is intended to bring in under the storage scheme, but as the matter stands at present it still appears to me that all that Mysore can do is to work out their scheme on the basis of half-monthly or other period supplies from the reservoir and thereafter restrict their irrigation channels and areas to fit those supplies. This matter had already been discussed before the Arbitration Committee and with these facts in my mind I assumed that Madras would read my letter as regards this point in the sense in which it was written and as herein explained.

26th October 1913.

M. NETHERSOLE,
Assessor.

Exhibit Ma. 6-d.

Enquiry by Madras Representative with reference to the Assessor's reply.—Exhibit Ma. 6-c.

With regard to the Madras (Exhibit Ma. 6) on the subject of information asked of Mysore and the Assessor's reply Exhibit Ma. 6-*c* I ask if I am correct in understanding that it is recognised by the Assessor that information regarding the means to be adopted to secure uninterrupted supply for power must form a feature of the rules for regulation of the Mysore Reservoir and that it is recognised that the communication in due course of such information is essential to this arbitration.

2. As regards a statement of what proportion of the whole new irrigation fed by the reservoir will have off-take from below the reservoir, which was asked for, it is likely that the rules referred to in paragraph 1 may be such as to make this information unnecessary for the preparation of working tables. If, however, this forecast is not realised, it is understood that the matter may be brought up again. I would ask if I am correct in this.

W. M. ELLIS, COL., R.E.,
Representative of Madras Government.

Exhibit Ma. 6-e.

Reply by the Assessor to the enquiry made by the Madras Representative, dated the 7th November 1913.

Both the inferences (1) and (2) specified by Madras in their enquiry in reference to Ma. 6-*c* are correct.

M. NETHERSOLE,
Inspector-General of Irrigation and Assessor,
Mysore-Madras Arbitration.

Exhibit Ma. 7.

THE MADRAS CASE.

PART I.—LEGAL ARGUMENTS.

Memorandum on the legal questions arising in connection with the Mysore-Madras Cauvery Project Arbitration.

The principal legal or *quasi*-legal questions to be dealt with arise under the first and second issues of the reference.

Points raised by second issue.

2. The second issue is intelligible enough. It may now be fairly taken as common ground that for the present purpose the prescriptive rights of Madras are to be ascertained as about the year 1910, and the point at issue is as to their *extent*. This is a mixed question of law and fact and is raised by issue 2-A. The nature and extent of the user by Madras at different periods must be ascertained and certain legal principles have to be applied to determine how far such user supports a prescriptive right in Madras in the year 1910. It is evident from the pleadings that Mysore and Madras differ as to some of these principles, as also the result of their application, and they have therefore to be discussed; but the last three words of issue 2-A refer back to the first issue which raises generally the question of the true interpretation of the Agreement of 1892.

Indefiniteness of first issue.

3. On the face of it it is difficult to see what exactly the first issue was intended to cover.

1910, the year to be considered.

4. Though at one stage of the controversy it was contended on behalf of Mysore that, as a matter of construction of the Agreement, Madras was entitled only to such prescriptive rights as existed at the date of the Agreement, while Madras contended that it was entitled to prescriptive rights as at the date when any particular work was proposed to be constructed by Mysore, this contention no longer requires notice. It is not now put forward in the Mysore case, and the Arbitrator himself has taken it that the parties are agreed that the year under consideration is 1910 and that they differ only on the interpretation of the law of prescriptive right.

Scope of the arbitration.

Question of "fairness" of Agreement.

5. An incidental question arising in a way on the interpretation of the Agreement is as to the scope of the arbitration itself. Mysore is evidently anxious to get the Arbitrator to pronounce that the Agreement itself is unfair to Mysore. Of course, the Arbitrator himself has already expressed his opinion that his function is only to interpret the document and not to suggest modifications. The question is not therefore pursued further.

Question to be decided —"Extent" of Madras rights or consent to particular reservoir?

6. Another point on which there is a difference of opinion between Mysore and Madras is as to whether the Arbitrator has merely to decide the question of the extent of the prescriptive right of Madras or the propriety or otherwise of the refusal of Madras to consent to the work proposed by Mysore. We do not contend that the Arbitrator has no power to decide the question of the extent of our rights, but we say that this is only incidental to his determination of the main question and that, on a true construction of the Agreement, the main question for the Arbitrator always is whether or not Madras is justified in refusing its consent to a particular work proposed by Mysore. In the ordinary language of the law courts,

an adjudication as to the rights of Madras is not a substantive relief claimable by Mysore from the Arbitration Committee, but it is only a subsidiary determination necessary to enable the Arbitrator to adjudicate on the propriety of our refusal to consent. The point turns solely on the language of the Agreement. It is clear from paragraph 4 of the Agreement that what is referred to the Arbitrator is "any case" in which there is a difference of opinion between Madras and Mysore, and it is the *case* that has to be decided by the Arbitrator and not the particular reasons or points about which the two Governments differ. Rule 2 also confirms this view. It says that Mysore shall not build any new reservoirs without the previous consent of the Madras Government or before a decision under rule 4. This shows that the decision under rule 4, if favourable to Mysore, takes the place of the consent of the Madras Government. Of course, Madras in giving its consent, or the Arbitrator in giving his decision, is directed not to prevent the construction of a proposed work "except for the protection of prescriptive right already "acquired, etc." That is, if either the Madras Government or the Arbitrator considers that the prescriptive rights of Madras will be injured by a particular work in Mysore, the result is that that work is not to be carried out, and Mysore has no right to ask the Arbitrator or the Madras Government to say what are the prescriptive rights of Madras at any particular date, apart from the bearing of this question on the main point. The concluding words of rule 3 also show that the Arbitrator has to give his decision not once for all on the totality of the prescriptive rights of Madras but with reference to "each individual case."

Application and effect of "fair and reasonable."

7. One other subsidiary point is that raised by Mysore with reference to the words "in accordance with what is fair and reasonable" in clause 3 of the Agreement. Mysore suggests that the Arbitrator should *devise* some method by which the water in the river may be usefully employed by both Madras and Mysore. For the reasons already stated, this is not the function of the Arbitrator. Some of the Mysore arguments also suggest that the *extent* of the prescriptive rights of Madras must be decided on the basis of what is "fair and "reasonable." This again cannot be admitted. On a proper reading of clause III of the Agreement, the words "fair and reasonable" in that clause have reference evidently to the expression "*mode of exercising* (the prescriptive right)", and this question comes up for the consideration of the Arbitrator only in so far as it may be necessary for the Arbitrator to see whether the protection of what he may find to be the prescriptive rights of Madras in accordance with the law on the subject necessarily requires that consent should not be given to the Mysore work; it is open to him to say that on a reasonable way of exercise of its rights by Madras such rights will not be affected by a work proposed by Mysore. It would be meaningless to suggest that a question should be determined both in accordance with law and in accordance with notions of what is fair and reasonable. What is to happen if the two criteria differ? The only sensible way of constructing the last sentence of the third clause is to apply the two criteria respectively to the two points to be determined and to hold that the *existence, extent and nature of the right* should be determined in accordance with *law* and that the *mode* of exercising the right (as ascertained) is to be fixed in accordance with what is *fair and reasonable*. It is clear from draft issue 2 attached to the Mysore Memorandum (My. 1) that Mysore also understood the clause in this sense.

Other points under first issue.

Memorandum of Sir K. Seshadri Iyer.

8. But presumably it is not for the purpose of these incidental questions only that the first issue has been raised. On the 7th of August 1913 the Arbitrator observed that the issue might be understood in the light of the Memorandum attached to My. 2, and the arguments directed to the points raised in that Memorandum. The reference must be to Sir K. Sheshadri Iyer's Memorandum of 1899 and not to that of 1890, extracts from which are incorporated in the later Memorandum. The Memorandum of 1890 was anterior to the Agreement and in fact denied that Madras could have any rights at all whether natural or prescriptive. It could thus have no bearing on the interpretation of the Agreement of 1892. As to the Memorandum of 1899, the statements therein are legally irrelevant to the construction of the Agreement, but we are asked to refer to it only as embodying the contentions that Mysore now wishes to put forward.

9. The Memorandum of 1899 asserts that the Agreement of 1892 was not intended to curtail in any way the rights of the Mysore State to utilise all waters within its own territorial limits. If this was not the intention and effect of the Agreement, it is certainly difficult to see what else it was. According to well-established rules of construction, we have to gather the intention primarily from the document itself. The Agreement clearly provides that Mysore shall not build new irrigation reservoirs whenever the effect of it will be to interfere with the prescriptive rights of Madras. Unless it could be said that Madras had no prescriptive rights—in which case the saving clause would be meaningless—this provision is clearly a restriction on Mysore constructing any new irrigation reservoirs. We must interpret the document as reasonable men, and it must be taken that the object of constructing new reservoirs was to utilise more of the water within the limits of the State, and that is why Madras insisted on the saving of its prescriptive rights. Of course, Sir K. Sheshadri Iyer, in his Memorandum of 1890, went so far as to say that there could be no prescriptive rights in favour of Madras, but this is not the present contention of Mysore, and it will surely be too much to assume that this theory of Sir K. Sheshadri Iyer was accepted by the Agreement of 1892 and that the saving clause in favour of prescriptive rights really saves nothing.

Sir K. Sheshadri Iyer as to the object of Agreement of 1892.

10. The only other material assertion in the Memorandum of 1899 is that in paragraph 4, namely, that "the Madras Government cannot "object on the ground of proposed or possible future new "works in its own territory. Its objection must be on the "ground of protection of rights already acquired and "actually existing and not of rights hereafter by user and enjoyment." If the words "already acquired and actually existing" and "hereafter" are understood to refer not to 1892 but to the dates of any controversy relating to any particular works to be proposed by Mysore, we do not contest this statement.

Date to which the expressions "already acquired" and "actually existing" in the Agreement should be referred.

11. The main question under the head of interpretation seems to be what is it that the parties to the Agreement meant or intended when they provided that Madras should not refuse its consent to any particular work proposed by Mysore unless that step was necessary "for the protection of prescriptive "right already acquired and actually existing, the existence, "extent and nature of such right and the mode of exercising it being in every case "determined in accordance with the law on the subject of prescriptive right to the "use of water and in accordance with what is fair and reasonable." What did the parties mean by prescriptive right and the law on the subject of prescriptive right to the use of water?

Interpretation of "prescriptive right" and "law of prescription" in Agreement.

12. Having regard to the fact that the two parties to the contract were not private individuals, but two neighbouring States, the law referred to could not possibly be any statutory enactment obtaining in British India or England. So far as Mysore is concerned, it is believed that there was no statute in force in 1892 dealing with the subject of easements and that there is none even at the present moment. Even in British India, the Easements Act is not in force in all the Provinces. The law intended to be applied could not possibly be a municipal law of limited applicability in the territories of one only of the two contracting powers. It could, therefore, only refer to the principles of international law and the principles of the English common law in so far as they might by their generality and intrinsic reasonableness commend themselves for acceptance in inter-State dealings. This is the reason why, in paragraph 6 (*a*) and (*b*) of his Memorandum of 1890. Sir K. Sheshadri Iyer felt himself obliged to appeal to international law. The principles invoked by him, however, have no foundation in that body of law.

13. Before going to the second issue it is perhaps well to point out that some of the contentions now put forward by Mysore are in a manner a repetition of their original claim of unlimited right. It will not then be necessary to deal with those contentions again, and some of the remarks to be made in this connection will in a measure also answer the suggestion of Mysore that the Agreement is unfair to

Mysore claim of "unlimited natural right."

them. Thus, in their rejoinder to the reply of the Madras Government to paragraph 27 of the Mysore Statement of Case, the Mysore Government say that they have no intention of infringing the existing prescriptive rights of Madras, but they are most anxious that the Madras Government shall not be allowed to indefinitely trench upon their natural rights to the use of water in their own territory, and in paragraph 24, "Madras can go on building reservoirs and, what is most detrimental "to Mysore, accumulating further and new prescriptive rights of irrigation." This view found place in Sir K. Sheshadri Iyer's Memorandum of 1890, paragraph 6 (*a*) and (*b*), and in the draft Agreement proposed by Mysore. The material portion of clause 3 of this draft ran as follows: "The Madras Government shall be bound "not to refuse its consent ..... the mode of exercising it *so as to control* "*or limit the natural right of the Mysore State* ....." This sought to embody the theory of Sir K. Sheshadri Iyer that Mysore had a natural right to divert for its own use all the waters of its rivers within its territorial limits, and it followed that other States could if at all urge as against this only such rights as they had acquired by prescription, for in this view other States would have no right to the flow of water merely on the ground of being riparian owners. This claim of natural right was emphatically repudiated by the Madras Government (*vide* G. O. No. 343-I., Public Works, dated 15th July 1889), and they therefore objected to the mention of natural rights as well as to the mention of the law of prescription in the draft Agreement. But Mysore, while agreeing to drop the reference to natural rights, insisted on retaining the reference to the law on the subject of prescriptive rights. The Agreement of 1892 must be held to preclude any contention of Mysore based on the assumption of unlimited natural right.

"Riparian rights" theory in international law.

14. The claim of unlimited natural right is also opposed to well-understood principles. The theory of riparian rights is as much part of international law as of private law, though of course like all rules of international law it cannot be enforced as between States, because there is no tribunal. The question has not arisen in Europe with reference to irrigation rights, but it has often arisen in connection with navigation rights on inter-State rivers. The generally accepted opinion is that no State should do anything to prevent the navigation of an inter-State river by other States through which that river flows. Irrigation is of comparatively little importance in Europe, particularly in England, and questions of irrigation rights are therefore not of frequent occurrence there even in private law. It is the subject of more frequent discussion in America, and the law is thus stated by Farnham in his book on "Waters and Water-rights," Section 6: "A "river which flows through the territory of several States or nations is their "common property. Each State is entitled to its navigation throughout its whole "extent so far as it can be exercised without injury to the rights of others. It is "a great natural highway conferring besides the facilities of navigation certain "incidental advantages, such as, fishery and the right to use the water for power "and irrigation. Neither nation can do any act which will deprive the other of "the benefits of those rights and advantages. The inherent right of a nation to "protect itself and its territory would justify the one lower down the stream in "preventing by force the one further up from turning the river out of its course or "in consuming so much of the water for purposes of its own as to deprive the "former of its benefit. ..... The gifts of nature are for the benefit of "mankind and no aggregation of men can assert and exercise such rights and "ownership of them as will deprive others having equal rights and means of enjoying them of such enjoyment. The acts of nations must be governed by principles "of right and justice ..... One State cannot authorise changes in the "river which will injure property in another State." In an article in 8 Harvard Law Review at page 144 the authors point out certain instances in which the United States Government treated the law of riparian rights as applicable to the relations of independent States. One of them is mentioned in volume I of Wharton's International Law Digest, Section 20.

Argument of "permissive" user in the past.

15. With reference to the user of water for irrigation by Madras in the past, Sir K. Sheshadri Iyer suggested that such enjoyment must be regarded as "permissive" to be allowed only so long as Mysore did not wish or was not able to store more water,

for, he said, it could not be said that Mysore never intended to store its rainfall for irrigation and other purposes to a greater extent than in the past. To take an analogy from private law, a similar argument was put forward in the case in (*Perumal* v. *Ramasami*, I.L.R., II Madras, page 16). But the learned judges refused to accept it. They pointed out that such an argument overlooked the fact that "to "support an inference of permissive enjoyment there must be some evidence, *apart* "*from a recent desire to extend wet cultivation*, indicating a *mutual understanding*, "when the user originated and during its continuance that it was only permissive "and not of right." (The italics are ours.)

16. On the footing of the applicability of the common law of riparian rights, the scheme of the Agreement of 1892 is perfectly intelligible. With reference to irrigation rights, the law was thus stated by the Judicial Committee in the case reported in (*Debi Pershad* v. *Joynath Singh*, I.L.R., 24 Calcutta, 865): "The right claimed by the appellants is a "right on the part of an upper proprietor to dam back a river "running through his land and to impound as much of its water as he may find con- "venient for the purposes of irrigation leaving only the surplus, if any, for the use "of the proprietors below. In the absence of a right acquired by contract with the "lower heritors or by prescriptive use, the law concedes no such right. The com- "mon law right of a proprietor in the position of the appellants is to take and to use "for the purpose of irrigation so much only of the water of the stream as can be "abstracted without materially diminishing the quantity which is allowed to des- "cend for the use of riparian proprietors below and without impairing its quality. "What quantity of water can be abstracted and consumed without infringing that "essential condition must in all cases be a question of circumstances depending "mainly upon the size of the river or the stream and the proportion which the "water abstracted bears to its entire volume.....The legal right of the lower "riparian owners is to have the water of the stream transmitted to them continu- "ously and without interruption and without any substantial diminution in volume, "their right being only subject to, the qualification that an upper proprietor may, "for purposes which the law regards as legitimate, withdraw from the stream as "it passes along his land so much of its stream as will not materially affect its "downward flow or impair their use of it." As pointed out in *Embrey* v. *Owen* (6 Exch. 353) the question is always one of degree and of considerable difficulty to determine, and it is therefore reasonable to suppose that in the present case the two parties who are respectively upper and lower riparian owners thought it best to lay down a test for determining reasonable user for irrigation purposes by reference to the existing state of irrigation from time to time as the question might arise. It is difficult to understand the Agreement of 1892 in any other light. There are two things in the Agreement which are significant for this purpose. One is that the Agreement recognises the right of Madras not merely to take steps to secure the exercise of its rights but to refuse consent to Mysore building any reservoir that will interfere with its rights. The other point is that the Agreement clearly has in view possible extensions of irrigation by Madras and that is why on its true construction it contemplates the extent of Madras rights being determined not once for all with reference to the state of things in 1892, but from time to time as each particular work may be proposed by Mysore. The Agreement undoubtedly assumes the right of Madras to use the water for irrigation and does not look upon the user either as wrongful or as permissive. Its object is not to secure to, or create in favour of, Madras a right which it would not otherwise have, but to obviate any difficulties which Madras may create in the way of Mysore extending its irrigation by raising objections on the score of interference with riparian rights. Prescription is not the *basis* of the right of Madras but *merely the measure* of its right so far as its rights come into conflict with the claims of Mysore, and subject to such prescriptive rights being left uninjured, the Agreement frees Mysore from the limitations which the common law doctrine imposes upon an upper riparian owner in the matter of his taking the water of a river for irrigation purposes. Thus understood, the Agreement is not only quite intelligible but absolutely fair to Mysore. The insinuation of coercion in paragraph 25 of My. 1 is absolutely baseless and the letter from which a mutilated extract is quoted lends no support to it.

Privy Council on extent of "riparian rights."

Agreement fair and intelligible on the basis of "riparian rights" theory.

Second issue.

17. We now come to the second issue.

Result of "prescription" as interpreted by us.

18. On our interpretation of the law of prescriptive rights as stated above in paragraph 12, it will not be necessary to enter into any detailed discussion of the several conditions laid down in the books with reference to prescriptive easements under the ordinary law. We are entitled to have as much water as we have required and used in the past, though in particular years or in particular periods we may not have had or may not have used quite so much as in other years, and so long as we do not need more water than before, Mysore would have no reason to complain or take advantage of any particular works that we may construct or any expansion of irrigation that we may be able to effect. The quantity of water we have been taking must be decided not with reference to any specific period but by a survey of a fairly long period making allowance for full years as well as short and *not* taking into account the effects of our recent irrigation works.

If ordinary prescription applicable.

19. Assuming, for the sake of argument, that the rights of Madras are to be ascertained as if on the footing that the ordinary law of prescriptive easements relating to water applied, what is the result?

Period to be considered.

20. One preliminary question in this connection is, what is the period of enjoyment to be shown and how is it to be reckoned? Mysore takes it to be a period of twenty years beginning from about 1890. The question will, to some extent, depend upon whether the rule to be applied is that known as common law prescription or that of statutory prescription. The difference between the two is that for the application of the statutory rule of prescription the enjoyment must be shown for 20 years and must extend to within two years of the suit (*see* section 15 (2) of the Easements Act), whereas under the common law prescription the court holds a right proved by immemorial user, though the other side has the opportunity to show that the user is not immemorial. *Prima facie* the contracting parties in this case must have had something like common law prescription in view. There is no statutory law as to easements in Mysore, and anyhow it will be out of the way to presume that Mysore intended to be governed by a statute of the Indian Legislature when the Agreement itself does not say so. The point, however, is not of much practical importance except to show that Mysore cannot confine our rights by the user at or about 1890. Under the rule of common law prescription we can avail ourselves of the rights we were enjoying even prior to 1890, if we have not since done anything to abandon our rights. Even under the Easements Act the Privy Council held that other modes of acquisition are not excluded by the Act (*vide Rajrup Koer* v. *Abdul Hossein*, I.L.R., 6 Calcutta 394). The law of prescription has been known and applied in India independently of statute (*vide Ponnusami Tevar* v. *Collector of Trichinopoly*, 5 Madras High Court Reports, page 61); and there is no reason why, while the Agreement speaks of the law relating to prescription, it should be confined to any particular statutory rule. It may also be pointed out that there will be some inappropriateness in applying the rule of statutory prescription in this case, because there cannot be said to be any suit in the present instance, and the condition that the enjoyment must be within two years next before the institution of a suit can have no application here. It may be suggested that the Arbitration proceedings must be regarded as equivalent to a suit, but a reference to Arbitration, is a course open only to Mysore (for Madras can never claim reference to Arbitration, unless Mysore proposes a particular work), and it will thus be an one-sided right of suit. But even assuming this step, in so far as any argument could be based on the allegation that the user prevailing in earlier years had not been continued up to within two years of the Arbitration, the answer is that there has been no non-user or interruption of user by act of the other party, and in the eye of the law the prior enjoyment will be regarded as continuing even in the absence of actual user, so long as there has been no interruption by the other party and nothing done by us to warrant an inference of abandonment (*cf. Koylas Chunder* v. *Sonatun Chung*, 7 Calcutta, 132, and *Janhavi Chowdhurani* v. *Bindu Bashini*, 26 Calcutta, 593).

"Common law" prescription or statutory prescription.

Arguments against applicability of "statutory rule."

Even if statutory rule applicable.

21. It may be well to dispose here once for all of certain arguments of Mysore which seek to bring in consequences which under the ordinary law arise from non-user. In this case there has been no non-user at all in the proper sense of the term. At best there have been variations in the quantity of water taken or in the extent of land irrigated or in the manner of the distribution or regulation of the water, but none of these is analogus to non-user The consequences which in the law of easements are said to follow from non-user arise only from absolute non-user (*vide* paragraph 26 *infra*), never from partial user in assertion of a general right to take what we want.

No "non-user."

22. Apart from particular objections, the general argument of Mysore under the head of prescription is as follows:—

(1) As the dispute began in 1910 and as twenty years' peaceful enjoyment is necessary for the acquisition of a prescriptive right, Madras is entitled to a supply of water to the area irrigated and the quantity of water actually used about the year 1890.

Mysore's general arguments on limitation stated.

(2) If the Madras Government have not been enjoying any of the rights claimed continuously for twenty years after 1890, they have no claim to them now. If the Madras Government imply (by their statement) that more water was used before the re-modelling of the Upper Anicut, they have lost the right to such supply since the re-modelling took place. Similarly, any special right claimed by Madras after the re-modelling cannot constitute a prescriptive right. They must prove that whatever quantity is claimed as due to them has been peacefully enjoyed without interruption for twenty years.

23. Having regard to the admitted fact that the Upper Anicut was re-modelled in 1899-1902 and that it did effect some changes in the pre-existing irrigation arrangements (though certainly not to the detriment of Mysore), the above argument of Mysore, if seriously taken, must lead to the logical result that Madras has no prescriptive right at all to anything. Before dealing with the argument in detail, it is necessary to invite attention to what may be called a fundamental fallacy underlying this argument.

Its logical result.

24. The contention above stated ignores the whole history of Madras irrigation prior to 1890. It is intelligible only on the assumption that up to 1890 Madras had no rights at all and further not even a user in fact, and that only in 1890 we made the commencement of a user (then without any right) which must be continued for twenty years from that date to ripen into a prescriptive right. The user of Cauvery water for Madras irrigation is literally immemorial, and by centuries of such user Madras had, not to speak of her natural rights, acquired a right to the water. Taking things as they stood about 1835, the condition of affairs was then as follows.

Fallacy underlying the arguments.

Immemorial rights of Madras.

There was no weir at the head of Srirangam Island, where the Upper Anicut now stands across the left of the two branches into which the main river, here called the Agunda Cauvery, divides at this place.

There were in existence large areas of irrigation under both these branches, but much the larger under the Cauvery, which is on the right side and is also the high level branch. As a consequence, the low-water supply almost all passed down the Coleroon, which is the left branch, and to adequately supply the larger area of lands under the right branch, namely the Cauvery Delta, a very large total flow of water was required in the main river above the point of division.

Thus, at that time, in order, therefore, to give adequate supplies to the Cauvery Delta lands, very considerable floods were required, and under the conditions described there can be no doubt that a much greater total discharge in the main river (the Agunda Cauvery) was required to pass adequate river supply to the Cauvery Delta than what would, under the subsequently existing conditions, have sufficed for such a purpose. As a fact, much loss of crops through inadequate supplies was then of frequent occurrence, and as the river flow was in those days certainly not less and was probably more than it is now, the inference is that the water required at the Upper Anicut site for the supply of the irrigated area below it was larger in quantity and the limit flow which could give an adequate supply was

much greater than under the conditions which obtained after the construction of the Upper Anicut which was built in 1836.

The average yearly area of irrigation in the Cauvery Delta in the years 1832 to 1836 was 601,035 acres, and such an area in a river of very fluctuating flow, such as the Cauvery, required, whenever available, and certainly made use of flow up to 7 feet into the right branch, and could not have been irrigated without fairly frequent freshes at least up to 6 feet passing into the head of the Cauvery.

Under the conditions existing before 1836, it is calculated that the total flow in million cubic feet in 24 hours in the main river (the Agunda Cauvery) required to produce depths of flow stated past the Cauvery head into the right branch was approximately as under:—

Depth, Cauvery head.		Discharge, Coleroon.	Discharge, Cauvery.	Total, Agunda Cauvery.
		M.C.FT.	M.C.FT.	M.C.FT.
5 feet	...	1,630	1,000	2,630
6 ,,	...	2,700	1,625	4,325
7 ,,	...	3,650	2,300	5,950

The above being the state of affairs prior to 1835, the proper way of looking at the question is to see if we have since lost the right to flow to the exent then required for user.

There is no suggestion that Mysore did anything to deprive us of our right, nor any suggestion of any adverse enjoyment as against us. Then, have we done anything to surrender our rights?

What we have done is briefly stated below.

In 1836 we built across the head of the Coleroon (the left branch of the Agunda Cauvery) a solid weir called the Upper Anicut which stood 6 to 8 feet above the river bed. The effect of this was to divert into the right branch of the river (the Cauvery) much of the water which under previously existing conditions would have passed down the Coleroon. This had the effect of greatly improving the supply which, with the same customary discharges in the river, it was possible to pass to the lands constituting the Cauvery Delta system.

The table below displays the greatly improved conditions under which supplies could be passed to the Cauvery, and this may be compared with the conditions tabulated proir to 1836.

Gauge-reading, Cauvery.		Discharge, Coleroon.	Discharge, Cauvery.	Total discharge, Agunda Cauvery.
		M.C.FT.	M.C.FT.	M.C.FT.
5 feet	...	Nil.	1,000	1,000
6 ,,	...	72	1,625	1,697
7 ,,	...	644	2,300	2,944

In order to protect the Coleroon irrigation from which supplies were diverted as above explained, a new anicut, called the Lower Coleroon Anicut, was built just below the head of the Vadavar, the feeder channel to the Veeranam tank. This work, which was situated some 70 miles below the Upper Anicut, enabled existing wet lands which would have suffered from the building of the Upper Anicut to be effectively supplied with the smaller flow now passed down the Coleroon.

Again, in 1899-1902, further changes in both Upper and Lower Coleroon Anicuts were carried out, in both cases, the solid crest level of these works being cut down 4 feet and lift shutters 6 feet high installed on the truncated works. This had the effect of giving still more efficient power of regulation and diversion of the flow of the Agunda Cauvery which was delivered at the Upper Anicut and facilitated the more efficient distribution and use of that flow.

Full details as regards the nature of the works here briefly referred to are given later.

25. In deciding the question of the effect of these changes certain well-established principles must not be lost sight of. During the time that a prescriptive right is being acquired certain conditions have no doubt to be conformed to as to the nature of the enjoyment; and assuming, for the sake of argument,

Principles in determining "loss" of pre-existing rights

that *prior* to the acquisition of a prescriptive right mere fluctuations in the user may be prejudicial to the acquisition of a right, once a prescriptive right *has been acquired*, it cannot be *lost* by any subsequent act not amounting to a surrender even though such act would have, previous to the acquisition of such right, rendered the user precarious and made a prescriptive acquisition (*Commissioners of French Hock* v. *Hugo*, L.R. 10 Ap. Ca., 336).

No "total" cessation.

26. As to extinction by lapse of time, there must be, as laid down by Chancellor Kent, a *total cessation* of the exercise of the right to servitude during the entire period necessary to raise the presumption of extinguishment (3 Kent's Comm., 449 marginal page; *vide* also section 47 of the Easements Act). This is certainly not the case here.

No abandonment.

27. As to abandonment (of our right to have as large a quantity of water as we had in prior periods). This is a question of *intention* and the presumption of abandonment cannot be made from the mere fact of non-user of the same quantity since (per *Alderson B. in Ward* v. *Ward*, 7 Ex., 838). In the last cited case it was held that an immemorial right of way was not lost by a non-user for upwards of twenty years, the user having been discontinued merely by reason of the party having had a more convenient right of way. Apart from statute, discontinuance will not have the effect of extinguishing an easement unless the surrounding circumstances are such as to warrant an inference of a release (*cf. James* v. *Stevenson*, 1893 Ap. Cas. 162 and *Kristodhone Citter* v. *Nandarini*, I.L.R. 35 cal., 889).

Illustrated by *Hale* v. *Oldroyd*.

28. An early case of *Hale* v. *Oldroyd* (1845), 14 M and W., 789, is instructive on this point. The defendant was the owner of a close containing a well the water from which had flowed immemorially into an old pond situated in one of three closes belonging to the plaintiff. Some time about 1812 the plaintiff made three new ponds, one in each of his three closes, and having conducted the water into them ceased to use the old pond which became filled with rubbish and overgrown with grass. In 1843 the defendant diverted the water and hence the action. On account of the intervention of a life tenancy a prescriptive right had not been acquired in respect of the new ponds as such, and the plaintiff's argument was that the new ponds were a mere substitution for the old one and that by abandoning the latter he had not lost his right altogether. So far as the abandonment was concerned, Pollock, C.B., said: "It appears to me that the plaintiff is right and that being "defeated as to the three new ponds he is entitled to resort to the other and it is "no objection that the old pond is not in a fit state to be used by him." Baron Parke observed: "The use of the old pond was given up by the plaintiff only "because he had the same advantage from the other three ponds. He did not "abandon his right but merely exercised it in a different spot, and a substitution is "not an abandonment."

29. It is, therefore, impossible to contend that by virtue of anything we have done in connection with the Upper Anicut we have lost our pre-existing right.

Argument based on joint possession prior to rendition.

30. In so far as we may rely on a prescriptive right acquired by enjoyment prior to 1890, one argument suggested in Sir K. Sheshadri Iyer's Memorandum of 1890, though not now put forward by Mysore, is that prior to the rendition we were in possession of Mysore also and that this unity of possession excludes the acquisition of any prescriptive right during that period. Unity of possession unaccompanied by unity of ownership could at the worst only suspend the acquisition of an easement. But in what sense can it be asserted that there was any unity of ownership or even of possession in the pre-rendition period? If the same person happens to be the trustee for the dominant and the servient owners, how can the common trusteeship affect the rights of the one or the other *cestui que trust*? The very argument shows the inappropriateness of applying private law to a case like this.

Principle of section 13 of the Easements Act.

One answer to this argument is that, if the usage of that period cannot be availed of to found a prescriptive right upon, the case may fall under the principle of section 13 of the Easements Act, and the result of the severance brought

about by the rendition would be to entitle us to all privileges of irrigation that we enjoyed at the time of the rendition (*see Maria Susai* v. *Secretary of State*, 14 M.L.J., 350). Anyhow, even assuming that the principle of section 13 will not apply, it will be too much to contend that after the rendition we start with an absolutely clean slate and that the result of the joint occupation was to sweep away all irrigation rights which Madras might have enjoyed for centuries prior thereto. Unity of possession for a time is not fatal to a claim by virtue of immemorial user as distinguished from statutory prescription—see *Aynsley* v. *Glover*, L.R. 10 Ch. Appeals, 283; and that is the basis of the rule of common law prescription.

Joint occupation does not destroy pre-existing rights.

31. Coming now directly to the question of the extent of our rights, the Mysore Government, in paragraph 4 of their case, say: "Madras is entitled under the Agreement to a supply of "water to the area irrigated and the quantity of water actually used about the "year 1890." It is not quite clear what exactly this means. Does it mean that we are entitled to the quantity of water necessary to irrigate the same area whether it now requires more water or less water, or to that quantity of water whether it now irrigates a larger area or a smaller area, or that we should satisfy both conditions, namely, that we can take the same quantity of water and irrigate the same area, but not take more to irrigate the same area or take the same water and irrigate a larger area. In our reply in the last sub-paragraph of paragraph 4 we say that our prescriptive right is in no way limited to the actual extent of land irrigated or amount of water used in three years before and three years after 1890. We object to attaching any particular importance to the year 1890 and also to confining our rights to the actual quantity we have used or the acreage we have irrigated. Our case is that we are entitled to a particular limit flow in the river and to certain minor additions.

"Extent" of our rights.

Respective contentions of Mysore and Madras.

32. It is no doubt generally laid down in the authorities that the measure of a prescriptive right is the extent of user, and we do not dispute this as a general proposition. But it is not a complete statement, and the question still remains, how is the extent of user to be measured? The extreme contention of Mysore we may take to be that we are entitled only to such water as may now (or in fact under possible future conditions) be necessary to irrigate the particular area which we can show we have been irrigating for the last twenty years (*vide* Rejoinder by the Mysore Durbar, paragraph 29 and conclusion). This is untenable. The true principle is indicated in section 28 of the Easements Act which provides that the extent of any easement and the mode of its enjoyment must be fixed with reference to the probable intention of the parties and the purpose for which the right was acquired, and it is only in the absence of evidence as to such intention and purpose that it is provided that the extent and mode of enjoyment must be determined by the accustomed user of the right. The evidence as to intention and purpose may be direct or circumstantial. The following statement in Mr. Doss's Tagore Lectures on "Riparian Rights," page 324, may be taken as correctly summarising the law:—

Legal principles in determining "extent" of prescriptive right.

Not limited to particular acreage.

Principle of section 28 of the Easements Act.

Doss.

"Where water rights are acquired by prescription, their extent must be "determined by the accustomed user, that is to say, the user upon which such right "is grounded; but this must not be understood to imply that the riparian owner "who has acquired the right is bound to use the water in the same precise manner "and to the same precise extent or apply to the same mill, that he must not enlarge "the area under cultivation or change the mode of it or enlarge the dimensions of "wheels or the horse-power of his machinery or change the site of his mill, for that "would really prevent the growth of agriculture and stop all improvements in "machinery. The principal rule is that he may change the mode, the object and "even the place of using the water, provided the variation thereby effected is not "so material as to sensibly prejudice the rights of other riparian proprietors. A "difficulty may, however, arise if the user has been varying in extent. It has been

"held that in such cases the court is not bound to found its judgment solely upon "the actual user proved, but may also take into consideration the surrounding cir- "cumstances."

33. Thus, if we make use of the same quantity of water now, but by a better arrangement and economy we serve a larger area with it, it is difficult to see how this in any way operates to the injury of Mysore or gives them any ground to reduce our supply.

Angell.

34. To the same effect Angell, in his book on "Water Courses", in paragraph 230, says: "It should be observed that the fact of how much "water has been actually used is not always decisive of the "nature and extent of the right. That is, if for the space of twenty years a certain "quantity of water has run uninterruptedly and as of right to a certain mill, the "right to have that quantity run becomes an appurtenance to the mill, though "the whole of it may not have been necessary for the purposes for which the mill "has been employed. . . . In *Taylor* v. *Wilkinson* it appeared that a certain "quantity of water had been accustomed to run in an artificial channel called Ser- "geant's Trench leading from the main stream, and Justice Story, in giving judg- "ment, said: The proprietors of Sergeant's Trench are entitled to the use of so "much of the water of the river as has been accustomed to flow through that trench "to and from their mills whether actually used or necessary for the same mills or "not during the twenty years last before the institution of the suit'." At paragraph 227 the same author observes that, where once the right has been acquired to use a certain quantity of water, a change in the mode and objects of use is justifiable, the only restriction in America as in England being that the alterations made from time to time shall not be injurious to those whose interests are involved.

Farnham.

35. In Farnham on "Waters" the rule is thus stated: "The right which is "acquired by the adverse use of the water of a stream is measured by the extent to which the claim was asserted and "maintained. The claimant cannot on the one hand gain a right which is in excess "of his claim. On the other hand, he will gain a right to all he claims although "he does not make use of it to the full extent." (Section 542.)

How our "claim" shown.

36. The nature of our claim and the intention underlying our user are best shown by the instructions of our department with reference to the regulation of the supply at the Upper Anicut.

Specific objections of Mysore.

37. Coming next to the particular grounds on which the extent of our claim is controverted by Mysore, the chief are: (*a*) that we are not entitled to the seven-feet depth claimed as a uniform measure and (*b*) that we are not entitled to any supply for Coleroon irrigation and the Veeranam tank.

To Coleroon and Veeranam tank claim.

38. The second point may be shortly disposed of. One ground of objection under this head is that the claim was only recently put forward by us. This is explained in our reply. It is next alleged that it is based on recent practice. If, as a matter of fact, the Coleroon was receiving a supply before the re-modelling of the anicut, the fact that by the re-modelling the supply is distributed in a somewhat different way between the Cauvery and the Coleroon or that we now allow the Coleroon only the leakage or wastage from the Cauvery does not matter, so far as Mysore is concerned. It will not deprive us of our rights or make our claim one of recent origin (*cf. Hale* v. *Oldroyd supra*).

To seven-feet depth claim.

39. The objection of Mysore to the seven-feet claim is based on several grounds. Some of them are arguments only of fairness and reasonableness. Those sought to be based on legal grounds are (1) that in five months out of nine the seven-feet depth is rarely reached and therefore it cannot be said that this right is being continually enjoyed, (2) that before 1899 the discharge passed down for irrigation was not seven feet, but somewhat less, (3) that in several months in the year either on account of local rains or on account of harvest, etc., it is not necessary to use the Cauvery water for irrigation, (4) that much of the water claimed will often run waste and there could be no prescriptive right to a wasteful use, and (5) that when the proposed Metur reservoir is built, the former irrigated area can be supplied by a smaller supply of

water in the Cauvery and that this entitles Mysore to a reduction in the quantity of water hitherto used by Madras.

Assumptions of fact not correct.

40. The assumptions of fact underlying these several arguments are dealt with lower down, but even taking those assumptions to be correct, the legal conclusions do not follow as contended for by Mysore.

Discussion of the several grounds.

41. Before dealing with the above arguments in detail, it may be pointed out that there is no warrant, as a matter of law, apart from any test of fairness, for the claim to break up the year into months and fortnights and distribute the supply of water according to the needs and supplies of particular months and fortnights. It will be impossible to ascertain the basis of a prescriptive right on such varying considerations. If the claim itself of Madras or the user all along has been definitely limited to particular days or months, that may be a different matter. The mere fact that in some years or in some months we do not get all the supply that we want, or the fact that at times we may not utilize all the water that is available, will not in law be an impediment to our acquiring a prescriptive right to the water flowing in the usual way in those months so as to be capable of being used by us, if and as we want; and the fact that in several years the seven-feet supply was not reached during particular months will not deprive the user of its character of continuity necessary to a prescriptive right. The Mysore Government take the period between 1890 and 1910 and point out that during this period the seven-feet supply was only rarely reached in certain months. For the reasons already stated, there is no particular reason why the investigation should be confined to these twenty years, and as to the infrequency in the opportunities for the exercise of the right to do things at long intervals are not unknown to the law. Thus in *Simpson* v. *Godmanchester Corporation*, L. *R.*, 1897, *Ap. Ca.*, 696, the House of Lords upheld an easement claimed by the respondents to open the gates of certain sluices or locks belonging to the appellant upon the river Ouse in times of flood or likelihood of flood in order to prevent damage to their own property. In the very nature of things the right could be exercised only in times of flood. And as for the argument of continuity, the law never considers an interruption due to seasons or other similar natural causes to be a breach of continuity. Thus in an early case of *Hall* v. *Swift* (4 Bing. N. C., 381) in answer to the argument that a water-course in respect of which the easement was claimed had not flowed for three years at all and consequently there was no continuous enjoyment for twenty years, the court observed: "This "might have arisen from natural causes, from perhaps a defect of springs or in conse- "quence of dry seasons. It would be too much to say that the rights of parties to "water-courses should depend upon a combination of such "fortuitous circumstances." Angell after citing *Hall* v. *Swift* quotes an American case of *Winnipiseogee Lake Company* "v. *Younge* in which Bell, C. J., observed: "It is said the bill does not allege any "certain height at which the water was kept up at any time. It is not perhaps "necessary to state such a fact. The water may be liable to great fluctuations and "if in substance it is alleged that it was kept up as high as their dam would raise it "when there was water, its being drawn by the plaintiffs for their own purposes "would not prevent their acquiring a right to the extent of their claim. . . . . "If the plaintiffs claimed right to keep the water in their dam at its full height "whenever they chose and had water to fill it and exercised that right for twenty "years agreeably to their claim, it would be conclusive that they possessed the "right." In India also there is abundant authority to the same effect. In *Perumal* v. *Ramasami*, I. L. R., 11 Madras, at page 18, in answer to a similar argument the court observed that it would be altogether unreasonable to hold in this country, many parts of which depend upon only rainfall for their irrigation, that no right of easement can be acquired in relation to it, because there may be failure of rain in particular years or during the time of cultivation and to that extent the supply may be precarious or casual (*see* also *Budhu Mandal* v. *Maliat Mandal*, I.L.R., 30 Calcutta, 1077;

Division into months and fortnights.

"Infrequency of use" of seven feet.

Infrequency of supply of seven feet.

Illustrated by *Hall* v. *Swift*.

Angell on Water-courses (s. 221).

Indian cases on the point.

Krista Das v. *Joy Narain*, 8 Cal. Weekly Notes, 158; and *Ghasiram Mandal* v. *Asirbad Mahto*, 13, Cal. L. J., 670). These cases also establish that the user need not be incessant or even annual, so long as there was no interruption to the claimant using the water whenever it was available and he chose to take it. It is not correct to base the calculation, as the Mysore Government does, on averages, because we want to take and have been taking as much water as is available from time to time up to the particular limit of 7 feet. The fact the average works out at a lower figure is no reason why our rights should be confined to that figure.

Rule of "average" inapplicable.

42. The argument based on local rains does not require to be noticed at any length. It is too uncertain and shifting a factor to base any definite calculations upon and, so long as it cannot be said that the claim put forward by Madras in former years has been limited to particular months or to particular seasons, our rights cannot be cut down with reference to the mere possibility of rains.

Argument as to "rains."

43. It is difficult to understand what exactly Mysore means by the argument that there can be no prescriptive right to a wasteful use. If what is meant is that we could acquire no right to water that has merely been flowing waste, this may be so; but if they mean that we could acquire no right to a quantity of water which we were actually using, merely because it was not an economical use or it was not the best use, there is no warrant for the proposition. It must also be remembered that as part of our user even in the best conceivable way a certain quantity of water must run waste, because all the water in the river could not be put on the land, but a certain amount of water in the river is necessary merely for the purpose of raising the water-level so as to make irrigation possible. This cannot properly be regarded as waste, for without it the required supply of water could not be put on the land.

Argument of "wasteful" use.

44. Lastly, it is not easy to follow the argument based upon the re-modelling of the Upper Anicut or our proposed Metur reservoir. We have already seen that a change in the user, even though it be to our advantage, does not affect our rights. It is not suggested that the re-modelling of the anicut has in any way increased the burden on Mysore. Prior to the re-modelling we required more water and were taking more water in order to irrigate the same area as we now do. We have only sought to better utilize and control the water by the re-modelling of the anicut, and the limit flow of 7 feet is the claim we have all along been making and acting up to. Mysore has no right to claim that we should not make better use of the water that we are entitled to. They can complain only if we make the easement more onerous to them. It cannot be said that the mere fact that by the improvements in our works we should be utilizing the water more regularly or more to our advantage, is itself an aggravation of the burden of the easement or an alteration in the mode of enjoyment which deprives us of our right. In *Hall* v. *Swift* already referred to, the court ask: "Suppose, for instance, "a party had a right to water and that he thought proper to straiten the bank. "Would he therefore lose his right? Again, suppose a party had a right of path-"way over the field of another and he straitened or narrowed the way. Would "therefore his right be gone and would the owner of the field have a right to ob-"struct him?" As pointed out by Angell (section 226), "Although the extent of "the right is to be measured and regulated upon the enjoyment upon which the "right is founded, the party is yet allowed freedom in the manner of exercising it." And in note 4 to section 228 the author cites a case of *Carter* v. *Shipman*, in which it was held that where the grant of an easement in the use of water is measured by the height in the dam to which the plaintiff is entitled, it is no objection that he has increased the capacity of his mill, so long as he demands the use of no more water than before. The case of *R.* v. *Tippet* (3 B. and Ald., 193), though a case of a public right of way, is instructive in this connection. By the side of a river there was a public towing path which was used and could be used only at high tide; but the river was since altered so as to become navigable at all times and the towing path thenceforth came to be used at all times. It was argued that the burden on the

Effect of "Upper Anicut" works and the proposed Metur reservoir.

No "aggravation" of burden.

R. v *Tippet*

servient tenement was thereby greatly increased and therefore the right of way was lost. The Court held that it was not lost and in the course of the "judgment Abbot, C. J., observed: "It was urged on behalf of the defendant "that before the alteration vessels could be moved only at certain times of "the tide which would include only a few hours of the natural day at any season "and a very small portion during the season of neap tides; whereas since the altera-"tion vessels may be moved at any hour in any season. . . . The purpose for "which the path was used continues the same. The public had a right to use the "path before the alteration at all times and seasons when it could practically be "used. The right was not limited or restrained by any ordinance of man and had "in truth no limit, but such as was imposed by the course of nature. . . . The "use made of the place in question is of the same kind now as heretofore and the "public right is of the same kind as formerly and we cannot say that the right is "lost by those measures which have expanded its exercise over a greater number of "hours than the natural state of the river formerly allowed."

45. In a similar case decided by the Judicial Committee and reported in I. L. R., 13 Calcutta, 136 (*Jadulall* v. *Gopalchandra*), the parties were owners of contiguous houses and periodically some three or four times a year scavengers hired by the plaintiffs passed through a passage belonging to the defendant to clean the plaintiff's backyard. After 1876 municipal scavengers were doing the same thing daily. It was argued on behalf of the defendant that the change of system thus brought about operated as a breach of the user and so destroyed the possibility of a prescriptive title. The Privy Council said: "Their Lordships cannot see that the "change of system works any discontinuance of the prior user. In point of "frequency the user is much more active than before. The purpose is still the "purpose of cleansing the privy. . . . It is argued that the change from the "practice of cleansing at long intervals to the practice of cleansing daily is so great "that the servitude gained by the user is materially aggravated, indeed that it is "applied to a new purpose which the plaintiffs have no legal right to do. It is "difficult to see how the servitude is aggravated . . . . It cannot be much "more onerous to the defendant that a small quantity of refuse should be removed "daily than that a large quantity should accumulate and be removed at long inter-"vals of time . . . A servitude gained for one purpose cannot lawfully be used "for another. What then is the servitude which the plaintiffs have acquired over "the defendant's land? . . . There is nothing in the proved facts to indicate "a limit to the user of the passage, except the limit that it must be a reasonable "user for the purpose of cleansing."

Privy Council in 13 Cal., 136.

46. The real question therefore is, what is the nature of the easement right we had? Have we any way changed it or made it more onerous to the servient owner? Unless Mysore can sustain the position that we are entitled only to such water as may be necessary to irrigate the particular area that has been under irrigation continuously for the last twenty years, no argument can be based on the *way* in which we use the water that we say we are entitled to. When a servient owner complains that he is injured by the altered user of an easement, the onus is upon him to prove such injury to his interest (*see Baxendale* v. *McMurray*, 2 Chancery Appeals, page 790). It need hardly be pointed out that, as stated by Sir K. Sheshadri Iyer in paragraph 4 of his Memorandum of 1899, the injury that Mysore must show must be with reference to the rights existing at the date of the controversy or arbitration and not with reference to possible future works contemplated by them.

Exhibit Ma. 8.

THE MADRAS CASE.

PART II—HISTORICAL AND DESCRIPTIVE.

Description of conditions of run-off and of Madras Irrigation under the Cauvery with descriptive and historical notes on the Delta Regulation works.

1. *Character of rainfall in the Cauvery basin.*—The Cauvery and its principal tributaries in Mysore rise amid the Western Ghauts in Coorg and Malabar, and it is to the heavy rainfall of the south-west monsoon in these hilly tracts that by far the greater part of the flow during the period of this monsoon from about the middle of June to the middle of September is to be attributed in a normal year, and still more in a year of deficient rainfall.

In the southern part of India the rainfall of the south-west monsoon is not generally heavy on the east of the Western Ghauts. Speaking generally, in the plains catchment of the Cauvery, the rainfall increases as the season progresses. The average is heavier in August than in July and heavier in September than in August. During the north-east monsoon, October to December, the rainfall in the Cauvery catchment on the east coast is generally heavy but diminishes inland and becomes less the further west and north one goes. The rainfall in the north-east monsoon in the hills of Coorg and the west coast is much lighter than during the south-west monsoon. In October only is there any considerable and certain rainfall. During the north-east monsoon, under normal conditions of rainfall, the Cauvery flow may be said to depend most on the run-off from the plains catchment and from the hills forming part of the catchment of the lower tributaries, the Bhavani, Amaravati, etc., while the flow of the earlier part of the year depends almost altogether on the run-off from the hill catchments of Coorg, Malabar and Mysore. In addition, there is some hill catchment in the Bhavani basin, mostly in the Nilgiri district, which receives fairly heavy rain in the south-west monsoon. The catchment of this river, indeed, gets a fairly good supply from both monsoons.

2. *Supplies in south-west monsoon dependent on hill catchment.*—Speaking generally, therefore, in a normal year the supplies of water in the Cauvery, are, in the earlier part of the irrigation season, June to September, mainly dependent on the precipitation of rainfall in the hills in Coorg, Mysore and Malabar. These hill tracts form only a small portion of the area of the Cauvery catchment—2,830 square miles out of 26,000 square miles—but it is on the run-off from this small area that in a normal year the greater part of the whole flow of the river is derived in the south-west monsoon. In the north-east monsoon (October to December) the whole catchment, and more particularly the southern and eastern portions, contribute the flow.

The rainfall of the south-west monsoon in the hills, while varying very considerably in quantity, is always heavy and in this respect never fails, although in a bad year the flow of the Cauvery is generally smaller than is required for direct irrigation of existing areas.

3. *Rainfall in north-east monsoon variable.*—The rainfall of the north-east monsoon, is not nearly so dependable as the rainfall in the hills in the south-west monsoon, and this specially is so as regards the heavy rain near the coast. In a bad year the water supplies in the Cauvery dwindle to a small fraction of the normal, and the whole flow of the river is inadequate to give the necessary water to the irrigated areas under it.

As an instance, the average rainfall in the Tanjore district during the months of October, November and December is 26·62 inches, but the rainfall in the year 1904 was only 15·98 inches; the monthly variation is much greater.

4. *Flow of the Cauvery in south-west monsoon.*—In consequence of the above conditions, the flow of the Cauvery in a normal year is during the south-west monsoon, to a very great extent, dependent on the run-off from the hilly catchment above the Sivasamudram anicut, and during this season the fluctuating contributions from the tributaries joining it below this, with the single exception of the Bhavani, are not to be depended on and generally are insufficient to make up for the losses in transmission from percolation, evaporation, etc. The Bhavani, however, can generally be counted on to contribute materially to the main river throughout the greater part of the south-west monsoon. In a bad year, this flow is, however, insufficient to make up for the draw-off of the Cauvery channels between the Bhavani confluence and the Upper Anicut.

5. *Conditions of flow in north-east monsoon.*—The north-east monsoon conditions are normally different and the flow of the river between Sivasamudram and the Upper Anicut is generally a progressively increasing quantity during this season. In a bad year, however, this is not the case as the contributions of the tributaries having their catchments in the plains are insufficient to balance the losses in transmission. There is a large area (94,000 acres) of direct irrigation under the Cauvery between the confluence of the Bhavani and the Upper Anicut, and it is found from the record of gaugings that in a bad year the draw-off for this area together with the losses by percolation and evaporation exceeds the inflow from tributaries, including the Bhavani and Amaravati.

6. Attention is also invited to Sir John Benton's description of the country in paragraph 11 of his note, dated 12th May 1911, re-produced in the margin* and to paragraphs I and II of Appendix E, Mysore Cauvery Project.

Character of the Cauvery river.

* The river drains mountainous tracts, those on the west having a heavy rainfall of over 96 inches; the declivity of the channel is steep, and the floods frequent, rapid and torrential. The rise and fall of the river at the head of the Madras Delta corresponds to every important shower in the catchment area. In Appendix I to this Note, I have given the dates of occurrence of the various floods which have occurred in the twenty years ending with 1909-10. It will be seen that the floods and freshets have been very numerous. The diagrams of the gauge-readings are far more serrated than those on almost any other large river in India.

7. *Forecasts of character of season impossible.*—From the characteristics described above, it will be clear that the river is of a nature which does not allow a forecast of probable flow a few days ahead to be made with any reasonable accuracy. The character of the earlier part of the season affords no indication whatever of what may be expected later, and it is not possible to economise water by forecasting probabilities from the existing conditions of flow of the river without grave risk of finding that the forecasts are not realized.

8. *Large area under direct irrigation by the Cauvery.*—In comparison with its mean total discharge the Cauvery irrigates by direct flow a very extraordinary extent of land, greater, it is believed, than that under any other considerable river under similar conditions.

The fact that this extent has not increased in recent years is a certain indication that the limits of fairly secured irrigation by direct flow have been reached. In regard to this matter, reference is invited to Sir John Benton's Note above referred to, which brings out this feature very clearly. This being so, it will be clear that in a bad year the supplies are likely to be deficient and such is, as a fact, the case. In the year 1899-1900, which is the worst recorded year, remissions of revenue in the Cauvery Delta amounted to Rs. 6,27,295: A computation of the losses which would be entailed on the ryots in a year in which such remissions are given shows that they would amount to about 70 lakhs at prices which formed the basis of the assessment valuation, and to about 90 lakhs at prices ruling in the year 1899. In this year, the total flow of the river at the Upper Anicut was only 203,744 million cubic feet, of which about 45,000 million cubic feet had to be involuntarily surplused.

9. *Supplies in bad years compared with minimum estimated requirement.*—The estimated requirement of existing irrigation under a system in which the supplies of water are under control and given out from a large storage reservoir in accordance with requirements was fixed in the Madras Cauvery Reservoir Project at 190,050 million cubic feet yearly (Volume I, paragraph 56), and even this estimate took no account of an area of 27,000 acres in French territory, which was omitted by oversight, involving a further requirement of about 5,000 million cubic feet.

As the total quantity of water required for irrigation is from 30 to 50 *per cent* greater if drawn from an uncertain and fluctuating source of supply than if drawn from a reservoir in the quantities actually required, it will be realized that in 1899 the river supplies fell very far short of what was required. The same occurred in the years 1904, 1905 and 1908 to a very material, although much less, extent.

10. *Necessity for receiving all water now delivered to irrigation.*—From the above it will be realized that the withdrawal from the existing irrigated lands in a bad year of any of the water which would, under existing conditions, be available for irrigation cannot but prejudice the success of the cultivation and Madras prescriptive rights and that it is essential that no water which is, under existing circumstances, in the enjoyment of Madras should be permitted to be impounded or diverted to any other use.

Brief Description of Madras Irrigation on the Cauvery.

11. *Madras irrigation above the confluence of the Bhavani.*—The irrigation under the Cauvery in the Madras Presidency commences seven miles above the new anicut built in 1900-1901 at Sivasamudram by the Mysore Engineers in connection with their Electric Power Installation, and consists of 764 acres under the Danakarai Anicut. The catchment area above the Sivasamudram Anicut is 8,500 square miles, comprising 2,829 square miles of hill catchment. The area of Madras irrigation between Sivasamudram and the confluence of the Bhavani, a distance of 115 miles, is only about 128 acres, and it is all within a few miles of the Sivasamudram Anicut. For the supply of this irrigation, a vent of 3 feet × 3 feet is left in the Kollegal section of the Mysore Sivasamudram Anicut.

12. *Madras irrigation between the confluence of the Bhavani and the Upper Anicut.*—It is believed there is no other irrigation in Madras by direct flow from the Cauvery between Sivasamudram and the confluence of the Bhavani, 115 miles below Sivasamudram. Below the confluence of the Bhavani, however, down to the Upper Anicut numerous channels for irrigation of marginal lands take off on both sides of the Cauvery in the districts of Salem, Coimbatore and Trichinopoly. These channels generally raise two crops of rice, and in addition there is a considerable area of sugar cane and garden crops, requiring perennial irrigation.

The lands are fertile and valuable and the cultivation has been practised for very many years. The channels are old ones and were in existence before the country came under the British rule. The total area so cultivated, which in previous reports, based on an erroneous statement in the Madras Cauvery Project, was stated at 61,000 acres, is now found to be 94,000 acres.

A list of channels and acreage is appended (Appendix III).

13. *Delta irrigation under the Cauvery.*—The Upper Anicut, which is 82 miles below the confluence of the Bhavani and 197 miles below Sivasamudram Anicut, may be regarded as the head of the delta systems of irrigation.

These systems are known as—

	About Acs.
(*a*) The Cauvery Delta System	890,000
(*b*) The Lower Coleroon Anicut System	112,000
There is also under the Cauvery System—	
(*c*) French Irrigation System	27,000
Total ...	1,029,000

14. *General description of river branches below the Upper Anicut.*—The Upper Anicut is situated at the upstream end of Srirangam Island, and the Cauvery here known by the name of the Agunda Cauvery, at this place divides into two branches. The left branch is called the Coleroon; it is the main branch of the river and the natural carrier of the greatest portion of the discharge. The right branch, however, retains the name of the Cauvery:

Srirangam Island is about 18 miles long, and in this length constitutes the tract of land dividing the Cauvery and Coleroon.

Near the tail of Srirangam Island, the Cauvery again bifurcates, the right branch being called the Vennar. At the tail of the island, the Cauvery divides into two branches, the left of which re-joins the Coleroon thus making Srirangam an island, while the Cauvery continues its course separated from the Coleroon by a deltaic tract of country gradually widening in extent.

The two rivers, the Cauvery and the Vennar, are the sources of supply of water to the Cauvery Delta System.

HISTORICAL NOTES REGARDING CONSTRUCTION OF REGULATING WORKS.

15. *Original construction of the Grand Anicut.*—In the early years of the nineteenth century, the Grand Anicut was the only effective work for diverting water for irrigation from the Cauvery or the Coleroon.

This work is one of considerable antiquity and was built during the time of one of the Chola kings. It consisted of a solid weir of stone in mud hearting faced with cutstone in chunam. The work served to block the river channel between the tail of Srirangam Island and the left side of the Cauvery Delta thus forcing water down the Cauvery which would, under other circumstances, have passed into the Coleroon through this channel. Under the conditions introduced by the construction of the Grand Anicut, the Coleroon, which is naturally the branch of the river taking the greater part of the water, was gradually becoming scoured deeper, while the Cauvery (the right branch) had its bed more and more silted up and the irrigation under it was suffering from inadequate supply.

In 1830, ten scouring sluices, 4 feet by 3 feet, were built in the right end of the Grand Anicut for scouring away the sand. The sills of these sluices were 10 feet below the level of the crest of the dam.

16. *Construction of the Upper Anicut in 1836.*—The silt difficulties could not be remedied by so small a work, and to deal fully with the matter the construction of the Upper Anicut was undertaken and finished in 1836. The work as then built consisted of a weir across the Coleroon (the left branch) at the head of Srirangam Island. The weir was originally divided by two islands into three lengths, but subsequently one island was removed and the weir carried over the site and converted to two lengths—

The South branch was 2,097½ feet long.

The North branch was 464 feet long.

It was, however, found that this solid dam gave rise to great accumulations of sand above this work, and in 1845 scourings luices were constructed spaced at irregular intervals along the length of the dam and a narrow arched bridge, from which the sluices could be worked, was built on the foundations of the existing work.

17. *Construction of the Cauvery Dam in 1845.*—After the construction of the Upper Anicut, it was found that there was a tendency for the Cauvery bed to scour out, and not only was an undue amount of water passed down the Cauvery in floods, but there was danger of command of marginal lands being in some cases lost. To obviate this, in 1845, the Cauvery Dam was built across the head of the Cauvery (the right branch).

The work is of the nature of a floor or grade wall merely intended to prevent erosion of the bed and margins of this branch at its head.

18. *Construction of 150-yard calingulah.*—At the same time a surplus escape, known as the "150-yard calingulah", was built in the left bank of the Cauvery, 3 miles below the Cauvery Dam. This is a weir allowing water to pass over it into the Coleroon as soon as the depth in the Cauvery exceeds a certain height.

19. *Bridges and Regulation at the old Vennar Head.*—About 2½ miles above the Grand Anicut the Cauvery bifurcated into two branches, the right branch being the Vennar, while the left retained the name of the Cauvery. Over the Vennar and the Cauvery at this place a narrow bridge spans the rivers:—

Over the Vennar 18 arches of 30 feet span.

Over the Cauvery 30 arches of 30 feet span.

At this place a certain amount of regulation of water was carried out by wood planks or shutters 1½ feet high. These planks could only be worked during the periods of low flow and were never efficient means of regulation.

20. *Alterations to the Grand Anicut.*—About 1840, a bridge was built over the Grand Anicut being carried on the existing work as a foundation.

Writing in 1874, Major Oakes describes the conditions at the Grand Anicut as follows:—

"The waterway of the dam is 960 feet, which is reduced to 735 feet by dam "stones for 2¼ feet above the crest which is not very level. With 6 feet of water "at the Cauvery Dam, the water begins to pass over this weir when 17,600 cubic "feet per second are passing down the Cauvery, but by means of the shutters the "water can be retained 2 feet higher when 23,650 cubic feet would pass down the "Cauvery."

21. *Construction of the Lower Anicut, 1836.*—The Lower Anicut was built about 1836 across the Coleroon about 70 miles below the Upper Anicut.

The object of the work was to ensure the adequate supply to the lands dependent on the Coleroon after the construction of the Upper Anicut had effected a diversion into the Cauvery of much of the water which under natural conditions passed down the Coleroon.

The anicut consisted of two branches with an island about 1,280 feet wide between them. At the same time, the North Rajan Voikal (channel) was dug to supply lands previously irrigated by four separate channels taking off from the left bank of the Coleroon. A channel (the South Rajan Voikal) was also dug to supply lands on the right side of the river in Mayavaram and Shiyali taluks of the Tanjore district.

22. *Construction of Cauvery and Vennar regulators and new Vennar Head, 1888.*—In the years 1886—1888, a material change in the works at the Grand Anicut was undertaken. A new head for the Vennar was cut from the Cauvery right side just below the Grand Anicut into the Vennar. Two regulators, being bridges with the openings controlled by shutters worked by screw-gearing, were constructed across both the Cauvery and the Vennar just below the Grand Anicut. The Grand Anicut was also fitted with falling shutters, 2 feet 10 inches high, enabling water to be held up to a height of 2 feet 7 inches above the crest of that work. These shutters replaced the damstones mentioned by Major Oakes. Thus, from 1888 fairly efficient control of the regulation of the water passing over the Cauvery Dam was for the first time obtained. The old Vennar head taking off the Cauvery 2½ miles above the Grand Anicut was not, however, closed till 1894, and up to then the supplies to the Vennar were received in part through the old head and in part through the Vennar regulator at the Grand Anicut.

23. *Remodelling of Upper, Lower and Grand Anicuts, 1899—1902.*—In 1899 to 1902, the crest levels of both Upper and Lower Anicuts were cut down 4 feet and on these crests throughout their whole length were installed long lift shutters, 6 feet high, capable of entirely blocking the water-way up to the level of their top when resting on the crest (or sill) of the anicuts. Similar shutters were installed throughout the length of the Grand Anicut, but the crest level of that work was not altered. The under-sluices of the Upper Anicut were done away with at this time, but those of the Lower and Grand Anicuts were left unaltered.

The above works gave greatly increased powers of control and diversion of river flow.

Details of the conditions of Regulation and Irrigation at different periods.

24. *Proposed arrangement of matters to be described.*—For the purposes of consideration of the various conditions of irrigation which obtained at different periods, three periods will be noted on :—

(*a*) The conditions before the construction of the Upper and Lower Anicuts by the Madras Government about 1836.

(*b*) Conditions from the period after construction of the Upper and Lower Anicuts till the remodelling of these works and fitting with large lift shutters in 1899 to 1902.

(*c*) The conditions subsequent to remodelling the Upper, Lower and Grand Anicuts in 1899—1902 up to the present date, and the nature of the works after remodelling will also be fully described.

In dealing with these, the conditions will generally be considered separately with reference to the following places :—

(1) The Upper Anicut,

(2) The Lower Anicut,

(3) The Grand Anicut,

and these will be separately described and the conditions of water control at each place noted on.

25. *1890 to 1899 taken generally as representative of conditions prior to remodelling of anicuts.*—The works at the Upper, Lower and Grand Anicuts were modified and improved from time to time between 1836 and 1899, but no material alterations were made between 1890 and 1899. The general irrigation conditions, except as regards control of floods at the Grand Anicut, were not very greatly altered in this period. The conditions obtaining in 1890 to 1899 will be described as representative of those which existed during the period prior to the remodelling of the anicuts.

26. *Irrigation conditions prior to construction of Upper Anicut, 1836, and its effect on irrigation.*—In this period there were no regulation works or diversion works of any kind at the Upper or Lower Anicut sites and the bifurcation of the river and the proportion of flow of the Agunda Cauvery which passed down each branch was left to nature.

The construction of the Grand Anicut, however, barred the return to the Coleroon past the tail of Srirangam Island of any of the low water or normal stage flow which passed into the right branch at the head of Srirangam Island.

Under these conditions, a large proportion of the flow passed down the Coleroon, and there was no need of any anicut to divert water into the channels taking off from the Coleroon for the direct irrigation of lands on both sides but especially on the left side of this river or for the supply of the Veeranam tank through the Vadavar. During normal supply periods there was more than ample water in the Cauvery for all direct supply, and during freshes the Veeranam tank was filled through the Vadavar and the storage served to protect the irrigation under it during periods of low supply.

The conditions then existing connoted ample supplies to the Coleroon irrigation, but frequently deficient supplies to the Cauvery and the Vennar Systems.

27. *Conditions at the Upper Anicut prior to 1899 and after construction of the Upper and Lower Anicuts.*—The construction of the Upper Anicut diverted into the Cauvery almost all the low flow of the Agunda Cauvery and a large proportion of the normal flow. As regards the floods, this construction also served to divert into the Cauvery a considerable increase of flood water. As a consequence of this construction, the irrigation under the Cauvery and the Vennar was at once relieved from the normal conditions of deficient supplies; but, on the other hand, during floods much damage and loss was sometimes occasioned by water passing down them in excess of what those rivers would carry. The Cauvery bed at the head of Srirangam Island commenced to open out and to deepen while accumulations of silt formed on the head of the Coleroon above the anicut. This led to the construction in 1846 of the Cauvery Dam to hold the river-bed at the head of the

Cauvery Dam from erosion and of the scouring sluices in the Upper Anicut to remove the sand accumulated at the head of the Coleroon.

The effect of these works was eminently satisfactory in the improved supplies of water passed to the Cauvery Delta System, and considerable extension of irrigation was realized in the thirty years which followed the construction of the Upper Anicut.

Trouble was, however, experienced from the accumulations of sand in the Coleroon head and also from excess of water in great floods passing down the Cauvery which could not be surplused in sufficient quantity at the Grand Anicut. Further, in years of flow below the average it was found that there was occasionally deficient supply of water to the areas under the Cauvery and the Vennar. It was not practicable to raise the Upper Anicut in the existing form of a solid weir as this would have had the effect of accumulating more sand above the Coleroon and accentuating the difficulties experienced from excess water in the Cauvery during high floods, and the remodelling of the Upper Anicut was the remedy applied and the details of the working under such conditions will be described later.

Upper Anicut.

The Upper Anicut as it existed before the remodelling.—The anicut was composed of two branches, North and South, with an island between them. Both branches were spanned by a bridge with arched openings.

The North Branch.—The North Branch had 12 spans: 4 of 33 feet 6 inches clear and 8 of 35 feet 3 inches clear.

In the 6th and 7th spans, there were eight under-sluices with shutters 6 feet span and 8 feet high with screw gearing.

The sill level of the under-sluices was 1·14 feet below the zero of the Cauvery Dam gauge, and the shutters could be raised till their lower edges were at level of 9·5 feet above the sill.

The top of the crest of the anicut in the other vents was at level of 5·91 feet above the zero of the Cauvery Dam north gauge.

South Branch.—The South Branch consisted of 57 spans of slightly varying lengths approximately as below :—

5	spans	of 30 feet	2	inches.
9	„	of 30 „	10	„
8	„	of 33 „	10	„
13	„	of 33 „	4	„
5	„	of 31 „	11	„
5	„	of 32 „	6	„
5	„	of 34 „		
7	„	were fitted with under-sluices.		
57	spans.			

The under-sluices were 17 in number of spans varying from 6 to 7 feet width and averaging 6½ feet. The sill level varies from + 236·45 to + 236·90 and averages + 236·75 or 0·49 foot above the zero of the Cauvery Dam gauge. The shutters could be raised so that their lower edges were on a level averaging 8·96 feet above the zero of the Cauvery Dam gauge.

The crest of the South Branch anicut in the 50 spans of bridge was of somewhat irregular level, but the average crest level was 5·7 feet above the zero of the Cauvery Dam north gauge.

29. *Rules for the Regulation of the Upper Anicut before remodelling.*—Between 1882 and 1899, two sets of rules of regulation for the guidance of the Superintendent at the Upper Anicut were in force. The first set was in force up to 1895 when they were altered at the instance of Col. Smart, R. E.

The two sets of rules are attached (Appendix I) and are referred to as the rules of 1882 and of 1896.

30. *General conditions of the Cauvery Delta supply under Rules of 1882.*—During this period, 1880 to 1899, the area irrigated below the Upper Anicut did not materially differ from the present irrigated area, but the conditions of supply

were somewhat different from what they are at present. The power of regulation at will and diversion of water at the Agunda Cauvery at the Upper Anicut from one branch to another was small.

The construction of the Upper Anicut had the effect of diverting into the Cauvery much water which would otherwise have passed down the Coleroon, but when this was done there was no power or option left as to the division of the water between the two branches and the proportion of flow in each branch was not capable of any regulation or variation.

The accumulation of silt above the new work led to the construction of scouring sluices which were designed primarily for the removal of the sand which accumulated above the solid anicut.

These under-sluices were for those days large and powerful, but their effect in altering the proportion of distribution of water between the two branches of so large a river was comparatively small.

The rules drawn up for working these sluices in 1882 had in view primarily the scouring of sand, and it was laid down that, when there was no scarcity of water, the opening of the sluices should commence when water rose to 6½ feet on the Cauvery Dam gauge, but in time of scarcity the sluices should be opened only after water rose to 7 feet.

It is desirable to consider the actual effect of this rule turned into discharges and the conditions under which it has been exercised.

First of all, the difference in the conditions and amount of discharges of the Cauvery Dam produced by openingt he sluices of the old Upper Anicut will be considered. Suppose a rising flood under conditions allowing such opening as will maintain the gauge of not less than 6½ feet. The discharge due to the full opening of all the under-sluices when 6½ feet of water was passing over the old Upper Anicut is calculated at 725 million cubic feet in 24 hours. The discharge over the solid anicut with 6½ feet gauge is 366 million cubic feet. The total discharge into the Coleroon is 1,091 million cubic feet. The total discharge of the Agunda Cauvery under this condition is 3,041 million cubic feet. In the event of the under-sluices not being opened, the same discharge would be passed with a gauge-reading of 7 feet (Cauvery Dam gauge).

The effect of opening the under-sluices has thus been to keep down the level of water half a foot and connotes a reduction in the supply of water delivered to the Cauvery and the Vennar of 300 million cubic feet per day allowing for discharge over the 150 yard calingulah. Thus the rules provided for scouring the sand at a time when water was not scarce at a sacrifice of water to the Cauvery system of 300 million cubic feet per 24 hours.

The rules, however, recognize that after a period of low supply the gain to be obtained by scouring does not compensate for the loss of water, and 7 feet on the Cauvery is provided for before allowing use of water for scouring. The above is on the supposition that all under-sluices are fully opened. Unfortunately the registers do not show the height to which each sluice was opened and the extreme case of all fully opened is the condition described above.

It is to be recognized that the opening of the under-sluices at gauge-reading of 6½ feet was not in order to surplus water which was not useful, but with a view to utilizing water for scour purposes. Further, the water so passed was used in supplying the Veeranam tank, and this was no doubt a consideration; but the main purpose for which the water used to be passed was for scour, and it was only so passed if the conditions of previous supply had been fairly favourable but not otherwise.

It is to be realized that the rules of 1882 were drawn up fully recognizing that, under the circumstances existing, it would be of constant occurrence for water which rose to 6½ feet to rise to considerably higher levels and that such floods could not, under then existing conditions, be excluded from the delta.

The construction of the Cauvery-Vennar regulators in 1886 to 1888 first gave the power of exclusion, but this was not fully availed of till 1894 when the old Vennar head was finally closed.

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The rules of 1882 had to steer between the evils, first of deficient supply and second of excessive flooding, and in addition the less important, but by no means negligible, matter of scour of sand had to be provided for as well as the supply for the Veeranam tank.

An examination of the water registers showing the working of the under-sluices for the twelve years 1882 to 1886 and 1889 to 1895 has shown that in these twelve years, under the operation of these rules, the opening of the sluices only took place with a less depth than 7 feet on the Cauvery Dam gauge on twenty-six occasions and that, with the exception of nine, all these occasions were in the north-east monsoon (October to December).

Thus, the rules of 1882, in actual practice, provided generally for a gauge-reading of 7 feet on the Cauvery Dam being realised before opening the under-sluices.

31. *Rules of 1896.*—It was, however, recognized by Col. Smart, when on special duty investigating the conditions of the Cauvery Delta, that the danger of over-flooding being gone, it was better to risk accumulation of sand than to take a risk of not passing sufficient supplies to the Cauvery Delta lands. At the instance of this officer the rules of 1896 were sanctioned. The rules of 1896 allow 7 feet on the Cauvery Dam before opening the under-sluices.

32. *The Upper Anicut as remodelled, 1899 to 1902.*—In 1899 to 1902, the Upper Anicut was remodelled. The crest was cut down and re-made to a uniform level of 2 feet above the zero of the Cauvery Dam gauge. The under-sluices were blocked up. On the whole of the length of both the branches large lift shutters, 6 feet high, worked from the bridge above were installed, and these shutters can be lifted so that their under sides are above any recorded flood level.

The anicut, after remodelling, consists of 55 bays of 40 feet each, the shutters being 6 feet high and the crest of the solid weir 2 feet above the zero of the Cauvery Dam gauge.

33. *Altered conditions through remodelling the Upper Anicut.*—The conditions of control and power of diversion of the flow of the Agunda Cauvery was, it will be recognized, greatly altered and extended by remodelling. It became at once possible to pass over the Cauvery Dam all the flow of the river up to a gauge-reading of 8 feet.

The table below shows the minimum flow in the Agunda Cauvery which can give the gauge-readings recorded at the Cauvery Dam before and after remodelling:—

Gauge at Cauvery Dam	Before remodelling, minimum discharge, Agunda Cauvery	After remodelling, minimum discharge, Agunda Cauvery
	M.C.FT.	M.C.FT.
5·6	1,365	1,365
6·0	1,696	1,625
6·5	2,286	1,950
7·0	2,944	2,300
7·5	3,613	2,650
8·0	4,450	3,020

It will be seen what greatly increased power is given by remodelling in the distribution of the available flow. It will further be recognized that some of the water which under old conditions would go down the Coleroon to the Lower Anicut is, under the rules of regulation now in force, passed into the Cauvery Delta. The lowering of the crest of the Upper Anicut has obviated the necessity for constant attention to the matter of scouring sand, while the system of passing floods at the lower level of the crest has prevented the accumulations which gave so much trouble prior to remodelling. The effect of this diversion of water on the Lower Anicut System is considered later.

It is, however, to be recognized that, under the conditions of the remodelled anicut, it is still quite practicable to pass water in the same proportions and with the same distribution of flow between the Coleroon and the Cauvery as obtained prior to remodelling.

34. *Rules of Regulation of the remodelled Upper Anicut.*—There have been two sets of rules of regulation of the Upper Anicut after remodelling which are

given in Appendix I. These rules were framed in 1902 and 1905 and are alluded to by reference to these years.

The rules of 1902, so far as supplies passed over the Cauvery Dam are concerned, followed as closely as practicable the spirit of the rules of 1896, *viz.*, they provided for passing on a rising fresh all water possible into the Cauvery until the gauge-reading of 7 feet was attained, and on a falling flood it was laid down that a gauge-reading of 8 feet should be maintained as long as possible. These rules were introduced on the authority of the Executive Engineer.

The rules of 1905 which were sanctioned by the Chief Engineer are those still in force. They are very similar to those of 1902; as regards irrigation supplies, the 8 feet level on falling flood is eliminated, and a specific authority to modify regulation to meet any abnormal contingencies is given to the Executive Engineer.

Lower Anicut.

35. *Description of the Lower Anicut prior to 1899.*—The Lower Anicut was built across the Coleroon about 70 miles below the Upper Anicut. At this place the river is divided into two branches by an island some 1,200 feet wide. The anicut is thus divided in two branches, each branch being a solid anicut surmounted by an arched bridge, each branch having 30 vents of 33⅓ feet span each, the total effective length of the anicut on each branch being thus 1,000 feet.

The level of the crest of the North Branch was+51·42 and of the South Branch+51·0. In each branch there are four sets of scouring sluices, each set being two sluices, the dimensions of each opening being 6 feet×5 feet.

The sets of sluices are spaced along each branch between every sixth and seventh span.

The sill level of the sluices of North Branch is+42·78.

The sill level of the sluices of South Branch is+43·30.

From each flank of the anicut, take off irrigation channels—

On the right side	The South Rajan voikal sill level, +43·36. Kumikimanniar sill level, +42·36.
On the left side	The North Rajan voikal sill, +43·93. The Vadavar zero of gauge, +44·80. In 1905 the zero level was altered to+45·02.

The three first-named channels supply by direct flow only.

The Vadavar, however, is the supply channel of the Veeranam tank as well as irrigating 10,600 acres by "direct flow."

The direct irrigation under the Lower Anicut system is about 60,000 acres, and there is 52,400 acres under the Veeranam tank.

The "direct flow" channels have head sluices which are under regulation. The Vadavar, however, has an open head and there are no surplus works throughout its length and it is capable of carrying into the Veeranam tank all water entering at the head up to the highest recorded flood level. The Vadavar is the oldest of the channels taking off the Lower Anicut and was in existence long before the Lower Anicut was built in 1836. The primary purpose of the Vadavar is that of a supply channel to the Veeranam tank.

The Veeranam tank is an old reservoir of a capacity of 918 million cubic feet and a catchment area of 256 square miles and with a bund about 10 miles long.

It depends for the supply of its ayacut during the south-west monsoon chiefly on the Vadavar which gets its supply from the Coleroon. During the north-east monsoon a considerable part of its supply comes from its own catchment.

The capacity of the tank is very small in relation to the 52,400 acres irrigated, and the tank can only hold enough water to fully supply this area for ten to twelve days, while a run-off of 1·6 inches from the catchment area more than suffices to fill it.

It will be shown later that the tank plays a very important role in the supply of the Lower Anicut irrigation, and without it the irrigation would be of a very precarious nature and would frequently fail for want of water. Prior to the

construction of the Upper Anicut when the major portion of both floods and ordinary flow of the Agunda Cauvery passed down the Coleroon, the supplies of the Veeranam tank ayacut through the Vadavar was fairly well secured.

The construction of the Upper Anicut, which diverted most of the low and ordinary stage of flow of the river from the Coleroon and left only the higher freshes for filling the Veeranam tank, made the construction of the Lower Anicut just below the head of the Vadavar necessary to secure the Veeranam tank ayacut and the directly irrigated area under the Vadavar.

The construction of the anicut, however, brought difficulties in its train and served to divert into the head of the channel great quantities of silt, and the bed level has been gradually rising in spite of silt clearances, working of scouring sluices, etc. The following description of the Vadavar as it existed in 1886 is extracted from a report by Mr. T. Lobb, Executive Engineer, Lower Coleroon Irrigation Project Division, dated 19th June 1886:—

36. "*The Vadavar channel.*—This channel, in addition, to its own irrigation, "has to convey water into the Veeranam tank. It is 14⅛ miles long, 100 feet broad "at its head diminishing to 60 feet at its junction with the Veeranam tank, the "bed-width being somewhat irregular. At the head of this channel near the Lower "Anicut there is a bridge on the Madras-Kumbakonam road of three spans consist-"ing of one centre opening of 60 feet and two side openings of 20 feet each.

"*The present available supply.*—As before stated in paragraph 41, at anicut "crest level this channel only receives one-third of full supply; at 2·56 feet above "the crest level it receives full supply."

This description may be considered as fairly representing the state of the Vadavar and the conditions of supply from 1880 until the Lower Anicut was remodelled in 1899-1900.

37. *Working conditions of the Lower Anicut prior to remodelling in 1899.*—The construction of the Upper Anicut in 1836 altogether changed the conditions of supply of the areas irrigated by the Coleroon. In place of the low flow of the river passing down the Coleroon and dividing with the Cauvery the flow in higher stages the positions were reversed and the Cauvery became, under conditions of low or medium flow, the predominant partner.

The changes so effected made it necessary to construct the Lower Anicut and also a new supply channel, the North Rajan voikal, to secure the supplies of the existing irrigation in South Arcot. The conditions of supply were so altered that the flow in the Coleroon became frequently only sufficient to supply the area of "direct irrigation" under the Lower Anicut and in case of low flow the first enjoyment of water was transferred from the Coleroon to the Cauvery System. It was only after the Cauvery was getting a good supply that the Coleroon could expect to enjoy the same.

The height of the Coleroon Lower Anicut as constructed was sufficient to secure full supply to the direct supply irrigation channels when the river water stood at the level of the anicut crest, but it was quite insufficient to allow an adequate supply to be passed down the Vadavar to feed by direct flow the irrigation depending on it, *viz.*—

10,600 acres direct.

52,400 acres through the Veeranam tank.

Under these conditions, it will be realized that the Veeranam tank could only receive water for impounding in times when the Lower Anicut was passing water to an appreciable depth over the weir; that is, it was necessary in order to fill the Veeranam tank and to furnish adequate supplies to the area under the Vadavar that water much in excess of what was actually run on the fields should be passed down to the Lower Anicut, and also that it was only during considerable freshes that the Veeranam tank could impound any Coleroon water.

Under the conditions existing prior to 1899 the supplies to the Coleroon system for gauge-readings at the Cauvery Dam under 5·5 feet was restricted to—

(1) Percolation under the Upper Anicut, Grand Anicut and other works.

(2) Supplies received through the under-sluices of the Grand Anicut or Upper Anicut.

In times when the Cauvery Dam gauge is below 5·5 feet in the south-west monsoon the supplies to the Coleroon as well as to the Cauvery were deficient.

As the Cauvery Dam gauge-readings became greater, the supplies automatically passed into the Coleroon greatly increased as noted below:—

Cauvery Dam gauge		Discharge over the Upper Anicut	Discharge through under-sluices, Upper Anicut	Discharge over 150-yards caling-ulah	Total discharge into the Coleroon
		CUSECS.	CUSECS.	CUSECS.	CUSECS.
6·0	...	828	.....	492	1,320
6·5	...	3,884	8,396	1,030	13,310
7·0	...	7,456	8,938	1,584	17,978
7·5	...	11,141	9,341	2,215	22,697
8·0	...	16,547	9,671	2,912	29,130
8·5	...	22,341	9,934	3,669	35,944
9·0	...	31,666	10,081	4,483	46,230

38. Turning to the Lower Anicut, the state of affairs there was as follows:—

The total area under irrigation was about 112,000 acres.

This, at a duty of 50 acres per cusec, requires for full supply a flow of 2,240 cusecs. Of this area, 52,000 acres are under the Veeranam tank requiring a draw-off of 1,040 cusecs so that the direct supply area is 60,000 acres requiring a flow of 1,200 cusecs.

The area of direct supply under the Vadavar is about 11,000 acres requiring 220 cusecs.

The other channels can be supplied fully with water just up to anicut crest.

The draw-off for these channels is 980 cusecs.

TABLE of discharges and draw-off in cusecs.

Crest depth		Reading on the Vadavar gauge	Total discharge, Lower Anicut	Discharge of Vadavar Gaugings by Mr. V. T. Srinivasa Ayyangar	Draw-off for direct irrigation in the Vadavar	Balance for the Veeranam tank	Daily draw off, Veeranam tank	Balance—debit or credit
North branch	South branch							
Nil.	Nil.	6·2	Nil.	320	220	100	1,040	—940
0·08	0·5	6·7	1,802	470	220	250	1,040	—790
0·58	1·0	7·2	5,556	615	220	395	1,040	—645
1·08	1·5	7·7	10,579	770	220	550	1,040	—490
1·58	2·0	8·2	16,584	935	220	715	1,040	—325
2·08	2·5	8·7	23,434	1,100	220	880	1,040	—160
2·58	3·0	9·2	31,018	1,300	220	1,140	1,040	+100
3·08	3·5	9 7	39,322	1,640	220	1,420	1,040	+380
3·58	4·0	10·2	48,231	1,960	220	1,740	1,040	+700

It will be seen that the Veeranam tank does not begin to impound until water in excess of over 2½ feet is passing over the South Branch Lower Anicut, which connotes a discharge over the whole anicut of 23,434 cusecs and a total flow required at the Lower Anicut of 23,434+2,240=25,674 cusecs. This connotes about 7·6 feet at the Upper Anicut with the under-sluices open.

Under these conditions it may be roughly taken that a gauge-reading of 7·6 feet at Upper Anicut meant full supply to the Lower Anicut but no impounding.

A gauge-reading in excess of 7·6 feet permitted impounding in the Veeranam tank.

The time which it would take to fill or empty the Veeranam tank with different gauge-readings on the Vadavar gauge is noted, on the supposition that no supply is received from the tank catchment.

The capacity of the tank was 918 million cubic feet.

Vadavar gauge			Vadavar discharge	Loss or gain per day after supplying irrigation		Days to empty full tank at this rate	Days to fill empty tank at this rate	Passing over Lower Anicut
				Loss.	Gain.			
			CUSECS.	M.C.FT.	M.C.FT.			CUSECS.
6·2	...	...	320	81·2	...	11	...	Nil.
6·7	...	...	470	68·2	...	14	...	1,802
7·2	...	...	615	55·7	...	17	...	5,556
7·7	...	...	770	42·3	...	22	...	10,579
8·2	...	...	935	28·1	...	33	...	16,584
8·7	...	...	1,100	13·8	...	67	...	23,434
9·2	...	...	1,360	...	8·6	...	107	31,048
9·7	...	...	1,640	...	32·8	...	28	39,322
10·2	...	...	1,960	...	60·5	...	15	48,234

The above table shows the very great importance of floods in the Coleroon for giving impounding water to the Veeranam tank and further that even direct flow supplies to the Coleroon System were quite insufficient unless considerable quantities of water were surplusing over the Lower Anicut and ordinarily by inference over the Upper Anicut or Grand Anicut.

Under the conditions described it is perfectly clear that if the surpluses over the Lower Anicut were curtailed to any considerable degree, the Veeranam tank irrigation must suffer. If all, or nearly all surpluses were cut off, this irrigation must fail.

The conditions of supply before the remodelling of the Lower Anicut were certainly unsatisfactory, and to these conditions is to be attributed the fixing of the level of the top of the lift shutters on remodelling of this work 2 feet above the crest level of the old work.

39. *Description of Lower Anicut after remodelling.*—The Lower Anicut was remodelled in 1899—1901 by cutting down the crest to a level of +47·42, four feet below the previous level of the North Branch, and installing on the crest throughout its length 60 lift shutters of 30 feet length and 6 feet in height which can be worked from the bridge above. The under-sluices were left unaltered.

The level of the top of the shutters, when fully lowered, is +53·42. The zero of the Vadavar gauge is +44·80. It may here be mentioned that in 1907—1909 the crest was further lowered by 2 feet, the shutters being made 8 feet in height. The level of the top of the shutters when closed remains unaltered, and this change does not have any effect on water-supplies or regulation although it facilitates passing large volumes of water in high floods.

40. *Reasons for remodelling Lower Anicut.*—The description given of the conditions of supply of the Vadavar and the Veeranam tank prior to 1899 shows that these conditions were unsatisfactory, and this was clearly recognized.

The solid anicut could not be raised because it was known that even with its existing height it had badly breached in floods on three occasions.

The decision to remodel the Upper Anicut in such a fashion as to reduce the quantity of water passed to the Coleroon in ordinary stages of river flow rendered a corresponding change in the Lower Anicut necessary because the condition of the Vadavar required that considerable and frequent freshes should be passed down to the Lower Anicut.

The system of remodelling carried out had the effect of enabling supplies to be passed into the Vadavar in quantities equivalent to what would have been possible by raising the anicut crest to +53·42. At the same time no tendency to increase of sand deposits was caused. Further, the passing of large floods down the Coleroon without increase in risk to the Lower Anicut was made practicable.

It is possible that, even if the Upper Anicut had not been remodelled, the conditions of the Vadavar supply would have necessitated remedial measures.

41. *Conditions of irrigation supply to the Lower Anicut System after remodelling the Upper and Lower Anicuts.*—The remodelling of the Upper Anicut and the rules of regulation introduced after remodelling had the effect of passing down

to the Lower Anicut of materially less water for stages of Agunda Cauvery flow between 1,500 million cubic feet and 3,000 million cubic feet.

On the other hand, the changes made at the Lower Anicut were such that it was possible to pass on to the fields all the flow of the Coleroon received at the Upper Anicut up to a reading of 8·62 feet on the Vadavar gauge connoting a discharge of 1,070 cusecs (*vide* table below).

Compare this with the previous condition when limit gauge was 6·2 feet and the discharge 320 cusecs.

The change in conditions of the Lower Anicut more than compensates for the shorter supplies passed for gauge-readings of under 7 feet at the Cauvery Dam.

While the new works have altered and improved the supplies of water available for the Cauvery System, the general supplies to the Coleroon System have also been improved and supplies can now be forced down the Vadavar without anything being passed into the sea up to a stage of discharge of the Vadavar of 1,070 cusecs, as against a stage of 320 cusecs, the previous limit.

It is, however to be recognized that, notwithstanding this great improvement, the supply of 1,070 cusecs is insufficient for feeding the direct irrigation under the Vadavar and the Veeranam tank by 190 cusecs and the tank capacity is required to supplement direct supply at all times when the Lower Anicut is not discharging. Floods are still required for the efficient working of the system, and the irrigation could not be adequately supplied without passing occasional freshes down the river of which a large percentage must be passed over the anicut to the sea.

Lower Anicut after remodelling.

TABLE of discharges and draw-off in cusecs.

Reading Vadavar gauge	Discharge over the Lower Anicut	Discharge of the Vadavar	Draw-off for direct irrigation, Vadavar	Balance for the Veeranam tank	Draff-off, Veeranam tank	Balance, debit or credit
6·2	*Nil.*	320	220	100	1,040	−940
6·7	*Nil.*	470	220	250	1,040	−790
7·2	*Nil.*	615	220	395	1,040	−445
7·7	*Nil.*	770	220	550	1,040	−690
8·2	*Nil.*	935	220	715	1,040	−325
8·7	* 6,430	1,100	220	880	1,040	−160
9·0	† 15,510	1,260	220	1,040	1,040	*Nil.*
9·2	‡ 22,040	1,360	220	1,100	1,040	+100
9·7	‡ 40,410	1,640	220	1,420	1,040	+380
10·2	‡ 56,670	1,960	220	1,740	1,040	+700

* Co-efficient, 0·5. † Co-efficient, 0·625. ‡ Co-efficient, 0·75.

Comparing this table with that given in paragraph 38, the new conditions will be seen as tabulated below :—

Reading Vadavar gauge	Discharge, Vadavar	Total discharge of the Coleroon to give gauge-reading		Discharge over the Lower Anicut	
		Before remodelling	After remodelling	Before remodelling	After remodelling
	Cusecs.	Cusecs.	Cusecs.	Cusecs.	Cusecs.
6·20	320	1,300	1,300	*Nil.*	*Nil.*
6·70	470	3,252	1,450	1,802	*Nil.*
7·20	615	7,151	1,595	5,556	*Nil.*
7·70	770	12,329	1,750	10,579	*Nil.*
8·20	935	18,499	1,915	16,584	*Nil.*
8·62	1,070	24,114	2,050	22,064	*Nil.*
8·70	1,100	25,514	8,510	23,434	6,430
9·20	1,360	33,388	24,380	21,048	22,040
9·70	1,640	41,942	43,030	39,322	40,410
10·20	1,960	51,174	59,610	48,234	56,670

The most material difference is that under new conditions a supply of 1,070 cusecs can be passed down the Vadavar without opening the shutters, that is, with a supply in the Coleroon which previous to remodelling would only have enabled less than one-third that quantity to be passed.

The rules for the regulation of the Lower Anicut both before and after remodelling are given in Appendix I.

42. *Veeranam tank water registers.*—In the statement (Appendix IV) an extract is given of the weekly water levels standing in the Veeranam tank in the months June to January for the years 1890 to 1909.

Above the level figures when the tank is full, letters serve to indicate the principal source from which the impounded supplies appear to have been received, that is, whether from the Coleroon through the Vadavar or from the catchment area of the tank; a study of the table will assist in enabling a fair estimate to be formed of the nature and extent of the part filled by the tank in bringing to maturity and securing the wet cultivation commanded by it.

The Grand Anicut.

43. *Conditions of irrigation and regulation at the Grand Anicut.*—From the time of construction of the Cauvery Dam about 1845 to the building of the Cauvery-Vennar Regulators, 1886—1888, the conditions of supply and regulation at the Grand Anicut remained unaltered in any very material degree.

In this period the supplies to the Vennar passed through the old Vennar head three miles above the Grand Anicut, and all the water flowing in the Cauvery at that work which was not passed into the Coleroon over the Grand Anicut or through the scouring sluices passed down the Cauvery. The means of regulation of discharge of the Grand Anicut during this period was slight. The scouring sluices were of small power and had no material effect in times of full supply in the matter of water distribution. The Grand Anicut had along its crest, dam stones 2¼ feet high, and it was only by blocking the spaces between these stones with earth and turfs that it was practicable to hold up water to a higher level than that of solid anicut crest without at the same time permitting any flow into the Coleroon.

Under these conditions, the undesirable fluctuations of supply from which all the Cauvery irrigation suffers were materially greater than after remodelling the anicut.

The Cauvery delta suffered alternately from excess supply in floods and deficient supply in the intervals.

44. *Description of the Grand Anicut prior to remodelling.*—The following is a brief description of the Grand Anicut from the time of installing falling shutters (about 1886) till remodelling by fitting large span controlled lift shutters in 1899.

The anicut consists of 30 bays of 32 feet length each.

In each bay was fitted four automatic falling shutters, 2 feet 10 inches high, with top of shutter when raised at level +191·75. The solid crest of the weir was at level +188·92. The sill level of the Cauvery and the Vennar regulators is +184·25.

The shutters were adjusted to fall automatically when the water level was such that it just commenced to spill over the top of the shutters.

The shutters were installed throughout 27½ bays. The remaining 2½ bays were occupied by the scouring sluices. The under-sluices were ten in number, each of sectional area 4 feet × 3 feet.

The sill level was +179·6. The work was remodelled in 1899 by removing the falling shutters and installing in all the 30 arches lift shutters 5 feet high and 32 feet span.

No alteration to crest level or under-sluices was effected.

45. *Remarks on conditions of working.*—The installation of falling shutters about 1886 was an advance on the previous system but still unsatisfactory. The shutters were liable to fall when not desired from the action of wind and waves. They were designed to fall automatically as soon as the water rose to the level of their top and the falling was not controlled from the bridge above the work. The raising of the shutters had to be done by hand by men standing on the weir crest, and the shutters could not be raised with more than about a foot of water passing over the weir. As a result, water passed over the Upper Anicut which would, had power of regulation been available, have been passed into the delta.

The construction of Cauvery-Vennar Regulators, 1886—1888, gave increased power of distributing the available flow between the Cauvery and the Vennar and of excluding from both flood water which would prior to their construction have passed down into the delta and which was in excess of useful requirements.

The rules for regulation of the Cauvery-Vennar Regulators introduced on the construction of these works aimed at exclusion of excess water from the delta while passing down into it water up to the limit of useful enjoyment. The rules in force prior to the remodelling of the Grand Anicut, 1899, are given in Appendix I.

It will be seen that the rules of 1892 provide for passing into the delta all supplies practicable up to a reading of 7 feet on rear gauge of the Cauvery and 8 feet on the rear gauge of the Vennar.

A regular proportion of distribution of supplies between the Cauvery and the Vennar is laid down up to a total available stage of river flow of 7 feet in front of the regulators; and from the rules it would appear that there was anxiety as regards the proportionate distribution for purposes of irrigation of river water available up to a front gauge reading of 7 feet.

After this stage is reached, strict proportions are abandoned.

The inference is that water was considered of such value up to 7 feet that very careful distribution between the two main irrigation rivers was necessary so as to divide the total supply fairly between the two.

As regards the first rule, some remarks seem to be called for.

It will be noticed it has no executive value and gives no executive direction but is of the nature of an expression of opinion.

The supplies stated in the rule to be "full and ample" are at a rate of 3 cubic yards per acre per hour to the Cauvery area and 2 cubic yards to that of the Vennar. These supplies were what had been laid down by several authorities and are constantly referred to in old records as what was recognized as the supplies required for the adequate irrigation of the areas under these rivers; that is the basis of duties to be aimed at.

This did not imply that the maximum useful supply of the very fluctuating flow available was at this rate, but the average supply to be aimed at was based on these duties which connote 44 and 66 acres per cusec, respectively.

Reference to the executive portions of the rules shows that careful distribution of water in the proportions of 3 to Cauvery and 2 to Vennar is laid down up to a stage of flow much higher than this, and it is clear from the whole tenor of the rules that the supply referred to in the first rule relates to average requirements and to the supply which, if given daily, would amply satisfy these.

This matter is treated of in the Madras Cauvery Project (Volume III, page 28, paragraph 34) when considering the duties of water for the existing cultivated area. It is here stated: "The maximum steady duty contemplated for the trans-"plantation season has been 44 acres per cusec for the Cauvery and 66 acres per "cusec for the Vennar. The river flow being very fluctuating, the rules provide "for carrying water in excess of these duties in both rivers when available."

The rules of 1894 were introduced on the closing of the old Vennar head which had been left open till then although the new head was in work from 1888.

46. *Conditions after the Grand Anicut was remodelled in 1899.*—The remodelling of the Grand Anicut only materially affected the irrigation conditions in rendering it possible on all occasions to pass into the Cauvery and the Vennar the whole flow available at the Grand Anicut up to the limit required for irrigation of the Cauvery Delta and except in times of really high floods, to exclude from the delta all water not required.

There was, after this remodelling, no involuntary surplus of water which could be useful and was actually required. The conditions in this respect, which obtained during the "upright stone" and the "falling shutter" periods, ceased after the fitting of fully controlled lift shutters.

The rules of regulation after remodelling, dated 1902 and 1905, are given in Appendix I. The rules chiefly refer to action to be taken in time of flood. Limits of flow are, however, given for the Cauvery and the Vennar to serve as a guide to

the regulation establishment in the absence of other instructions. In actual practice, the limits 4·5 feet on the Cauvery and 7 feet on the Vennar are exceeded almost invariably unless after considerable quantities of rainfall in the irrigated areas.

47. A table (Appendix II) has been prepared from the water registers at the Grand Anicut showing for 1900 to 1908 the number of times water was carried purposely in excess of 4·5 feet in the Cauvery and 7 feet in the Vennar in comparison with the number of times it was practicable to do this. In the year 1909, owing to breaching of the Grand Anicut, regulation was abnormal and water was kept as low as possible and very free surplusing was resorted to owing to the unstable condition and failure in July of the right end of the Grand Anicut.

This table shows that it is customary in July and August and September frequently to pass supplies in excess of the levels stated.

In October and November the practice is variable and follows the character of the season; the stated levels are, however, not frequently exceeded.

The table shows that the officers in charge of the works availed themselves very freely of the power afforded by the rules to call for additional water if required.

Further the tables (Appendix VIII) show for 20 years 1890 to 1910 the actual daily gauge readings of the Vennar and Cauvery and gives thus a measure of the actual flow passed in practice. Prior to 1888, much involuntary flow passed down the Cauvery and Vennar and the gauge readings do not therefore give valuable evidence of enjoyment and use.

Exhibit Ma. 9.

THE MADRAS CASE.

PART III—ARGUMENTS—SECOND ISSUE.

Consideration of Madras Rights and Claims.

Immense interests involved.—It is desirable, before commencing to give the details on which the consideration of this case must be judged, to draw attention to the immensity of the vested interests involved in the Madras Presidency.

2. *Area of Madras irrigation under the Cauvery.*—The area of irrigation under the Cauvery below the Upper Anicut is approximately—

	ACS.
In British territory	1,002,000
In French territory	27,000
Total ...	1,029,000

Above the Upper Anicut in Madras, there are numerous channels taking off from the Cauvery on both sides of the river irrigating approximately—

	ACS.
Below Bhavani confluence	94,000
Above Bhavani confluence	1,000
Total ...	95,000

A considerable portion of this area raises two crops or perennial crops. The total area of wet cultivation is therefore 1,124,000 acres.

A great part of this area is very old irrigation and was cultivated as irrigated land before the country came under the British Government. These lands have been in the enjoyment of the free flow of the Cauvery, reduced only by the draw-off of the existing irrigation channels in Mysore, for a very long period.

3. *Area proposed to be irrigated in Mysore.*—The area irrigated in Mysore under existing Cauvery channels is about 108,000 acres.

The area proposed to be newly irrigated has been variously stated, but appears to be about 150,000 acres.

This statement of areas will give a fair indication of the relative importance of the respective interests of Madras and Mysore involved in this arbitration.

4. *Madras existing interests very large compared with Mysore prospective interests.*—On the one hand, there is an existing prescriptive right of the lands in Madras, over a million acres in area, to receive and enjoy without restriction whatever water they have heretofore been receiving. This water is the life blood of the prosperity of the Madras districts of Tanjore, South Arcot and Trichinopoly: it also materially affects the prosperity of the people of Salem and Coimbatore districts.

The whole of this area has an undoubted right to receive the natural flow of the Cauvery, and any material diminution of this supply must affect the prosperity and material well-being of the holders of these lands as well as the revenues of the Madras Government and the Government of India.

5. *Existing rights to be fully safeguarded.*—The decision come to should, therefore, be such as to involve no risk of any appreciable injury to the Madras irrigated area. It is claimed that in cases of doubt which must inevitably crop up in an inquiry into such a complex matter the benefit of the doubt should be given

to Madras, whose rights and liabilities are actually existent and must be fully safeguarded. It is urged that the interests involved are too great to justify taking any risk. This matter once decided, a reversal or modification of the decision will be difficult, if not impossible, after new and important interests and liabilities are created in Mysore, and it is submitted that no alienation of water now passed down to Madras is justifiable, if such alienation involves any risk whatever of appreciable loss, by diversion of water from the lands which have been hitherto in enjoyment of it.

6. Only flood water which will, if passed down by Mysore, be surplused into the sea without enjoyment or use by Madras and which will certainly not be required for Madras irrigation should be permitted to be impounded by Mysore and when, as is frequently the case, it is doubtful whether water will, if passed down, be actually used, it is unjustifiable to expose Madras interests to any risk of loss in order to prevent a possible but uncertain waste of the water. However laudable it may be to utilize such water, this should only be permissible in cases where such utilization does not involve Madras lands in any risk of loss of any of their existing rights in the form of useful supply.

7. *Consideration of Madras prescriptive rights before the remodelling of the Upper and Lower Anicuts.*—The descriptions in Part II of works and irrigation conditions, together with a study of the rules of regulation and record of gauge-readings and discharges at the Upper Anicut, furnish the data for an estimate and measure of the prescriptive rights of Madras.

From the descriptions it will be gathered that as regards quantities of water required to enable the customary supplies to be run on to the Madras irrigated fields there were no very material changes between the construction of the Cauvery Dam about 1845 and the remodelling of works commencing about 1899.

The limit amount of water required in 1899 was materially the same as at any time throughout this period, and the rights existing in the period 1890 to 1899 were similar both in quantity and in system of usage and enjoyment as in the previous decade and the previous one before that. Any minor alterations affecting the limit made during the period 1846 to 1899 were of a nature tending to economy and certainly not tending in any way to increase the limit flow actually enjoyed and used.

8. *Supply for the Cauvery System and for sand clearance.*—The rules of 1882 and 1896 show that 7 feet on the Cauvery Dam was fixed as the ordinary full supply level required for the Cauvery Delta, and this, as supplied under the conditions which existed prior to 1900, is the amount claimed by Madras.

It is, however, to be pointed out that the rules of 1882 permit the use of water for scouring at the Upper Anicut "except in times of scarcity" whenever the water rises above 6·5 feet on the Cauvery Dam gauge, although the rules of 1896 did not permit opening at any time in the absence of special conditions until there was 7 feet on the gauge.

An examination of the water registers for the twleve years 1882 to 1895, omitting the years 1887 and 1888 of which the registers are not available, shows that in these years only nine times in the south-west monsoon, and on twenty-six occasions altogether, did the opening of the under-sluices take place when there was less than 7 feet on the gauge, while the opening of the sluices when the gauge read 7 feet or over occurred on 36 occasions. This proves that, under the rules of 1882, it was more usual than not to wait for a gauge-reading of 7 feet before opening the under-sluices.

9. *Prescriptive right to water for scouring at the Upper Anicut.*—The opening of the sand sluices when water stood below 7 feet on the Cauvery Dam gauge served a double purpose, *viz.*, to scour sand from above the Upper Anicut and to give a supply to the Lower Anicut. Madras has undoubtedly a prescriptive right to the use of water for both these objects. With a gauge-reading of 6·5 feet the discharge of the Agunda Cauvery was—

	M.C.FT.
Over Cauvery Dam	1,950
Over Upper Anicut	366
Through under-sluices fully open	725
Total ...	3,041

In order to obtain 7 feet on the Cauvery Dam with the under-sluices closed, it was necessary to pass one foot of water over the Upper Anicut, the crest of which was only 6 feet above the level of the Cauvery Dam gauge. The total discharge therefore under these conditions was—

	M.C.FT.
Over Cauvery Dam	2,300
Over Upper Anicut	644
Total ...	2,944

In order not to complicate the case by putting forward a different figure, the smaller of these two figures is that claimed by Madras as the limit of flow to which she has by prescription a preferential right for the supply of the Cauvery Delta although the larger one might strictly be claimed.

10. *Conditions of supply at the Lower Anicut.*—Considering the conditions at the Lower Anicut both before and after remodelling, it is clear that the system in either condition can only be fully supplied when not infrequent freshes of considerable magnitude are passed down to this weir. This is specially the case during the south-west monsoon, when the yield of the catchment of the Veeranam tank will be materially less than in the north-east monsoon and especially so in the earlier months, June to August, in which the rainfall is small and the ground dry. The capacity of the tank is so small in comparison to the ayacut that it is clear that it is rather by direct flow from the Coleroon than by storage that the crops are raised, the direct flow being assisted and supplemented from impounded water. It has indeed been the practice to speak of "full supply" in the Vadavar when referring to a stage which can only supply by direct flow the whole ayacut under both channel and tank.

It has been shown* that even for this direct flow supply it is necessary to maintain a gauge-reading at the Vadavar head of 9·0 feet.

*Part II, paragraph 41.

Even after remodelling the Lower Anicut, the conditions necessary to enable such a supply require a total flow in the Coleroon above the Lower Anicut of 17,750 cusecs. Such a flow from the nature of the case can only be occasional and intermittent. These conditions make storage necessary, and extra flow to provide water for impounding over and above the daily draw-off is therefore also necessary. The conditions of the Lower Anicut already described† show clearly that it is only when the Veeranam tank stands full that the water of floods surplused over the Upper Anicut do not contribute materially to the irrigation under that tank and that a condition of surplusing at the Lower Anicut is essential to either impounding or passing adequate supplies for the Veeranam tank ayacut. Such being the case and the conditions being as described, it cannot be doubted that the impounding by Mysore of flood waters must, under existing conditions, deprive the Veeranam tank and its ayacut of supplies except at such times as it stands full.

†Part II, paragraphs 38 to 41.

Under such a state of affairs the prescriptive rights of Madras extend to all floods and flood waters during such time as the Veeranam tank is not full.

It is recognized, however, that the conditions of the supply of the Veeranam tank are not such as conduce to economy of water and that by enlarging the tank and also the carrying capacity of the supply channel it is possible to obtain a supply without the heavy surplussing over the Lower Anicut which is, under the circumstances described, a necessary condition.

11. *Full legal prescriptive right not claimed by Madras.*—The Madras Government do not in this matter claim the full limit of their prescriptive right, as enunciated above, and have limited their claims to the water required at the Upper Anicut under the conditions existing prior to remodelling for passing over the Cauvery Dam a depth of 7 feet of water with the under-sluices closed.

12. *Alterations to the Vadavar and the Veeranam tank in progress.*—It is considered here desirable to state that an estimate was sanctioned in 1906 for enlarging both the capacity of the Veeranam tank and its supply channel, the Vadavar, while the scope of the system was to be extended to supplement the supply of the Shatiatope System under Vellar.

The alterations are—

(*a*) Raising the full level of the Veeranam tank 2 feet and thus increasing its capacity from 918 million cubic feet to 1,489 million cubic feet.

(*b*) Enlarging the Vadavar by widening and re-grading to give it a carrying capacity of 1,660 cusecs with water at the level of the top of the anicut shutters when closed in place of the existing capacity of 900 cusecs.

(*c*) Enlarging an old existing sluice and channel made to feed the Vellar from the tank.

(*d*) The vent area of the sluice to be increased from 120 square feet to 200 square feet.

These works were designed to allow of passing water from the Veeranam tank into the Vellar and from this to the Shatiatope System.

It was proposed to increase the ayacut area under that system by 5,000 acres from 29,000 acres to 34,000 acres. The works were sanctioned in 1906 and are nearly complete.

What is required to improve the existing conditions of supply of the Veeranam tank ayacut forming part of the Lower Coleroon System is the enlarging of both the tank and its supply channel; and under the sanctioned proposals the cost of works in progress is being shared between the two systems, the Shatiatope System paying for enlarging the sluice and the tank and the Lower Anicut System paying for enlarging the Vadavar.

These works now mentioned are calculated to alter materially the conditions of irrigation of the area under the Veeranam tank and the Vadavar. The actual rights of Madras are, however, not affected. Those rights embrace a claim to all flood water whenever the Veeranam tank is not full up to 918 m.c.ft., the original capacity level.

Remarks on claims to supply made by Madras.—Although there is thus prescriptive right to floods, the Madras Government are not making a claim to these, but have limited their claim to what water was required in the Agunda Cauvery at the Upper Anicut to enable 7 feet to be passed over the Cauvery Dam under the conditions obtaining for many years prior to 1899.

While the water so claimed would not, under the then existing conditions, have served even for the direct full supply of the Veeranam tank ayacut, under the altered conditions described, the limit water claimed will give sufficient to supply the Veeranam tank and the Lower Anicut System in addition to the Cauvery. The claim made, however, is greatly less than the full prescriptive rights of Madras.

In waiving their strict legal prescriptive rights to all flood water for the supply of the Lower Anicut System so long as the Veeranam tank does not contain 918 million cubic feet of water, the Madras Government claim that a specific supply for this system over and above what has been customarily passed for the Cauvery System is absolutely necessary.

It is only the improvements to the Lower Anicut and the further improvements to the Vadavar in progress which make it possible, without grave injury to the Veeranam tank irrigation, to waive a claim to floods.

The system of supply by floods is admittedly wasteful although it is on this system that the supply of the Veeranam tank has actually depended from time immemorial.

The Government of Madras, however, consider it fair and reasonable, under the altered conditions which render it possible to substitute a less wasteful system, to waive the claim to floods, but they do so only on the express condition of an allowance being given which will, under the altered conditions, fully secure the supply of their irrigation.

14. *Claims of Madras to water at the Upper Anicut include provision for specific supply to the Lower Coleroon System.*—The claim of Madras at the Upper Anicut as formulated leaves available for supply to the Lower Anicut System and for occasional extra water required for the Cauvery System the water which, under the conditions obtaining prior to 1899, used to be passed into the Coleroon through and over the Upper Anicut.

Under the conditions of the revised claim made by Madras (Exhibit Ma. 3, paragraphs 3 and 4-II), the claims for specific supply made in the short statement of the Madras case, [paragraph II (*c*) and (*d*)—Exhibit Ma. 1], are waived not because they are not required, but because the revised claim comprises and includes suitable provision for the above purposes. Therefore. should the revised claim made be curtailed on any grounds, these claims for specific supply must be revived.

15. *Claims of Madras for both systems at the Upper Anicut.*—The Madras Government have, on the general grounds stated, decided to confine the claim to the prescriptive rights of Madras to the limit flow required under the conditions obtaining in and before 1899 to produce over the Cauvery Dam a flow of 7 feet under normal conditions and with the under-sluices of the Upper Anicut closed. This amounts to a limit flow of 2,944 m.c.ft. a day at the Upper Anicut.

The Government claim that, prior to the remodelling of the Upper Anicut, 1898—1902, their prescriptive rights to this limit flow had been fully acquired and that no action taken by them in remodelling their works with a view to effecting economies and securing more efficient use of the water to which their right existed has in any way diminished or impaired such rights and that they remained unimpaired in 1910 just as they existed prior to the remodelling of the Upper and Lower Anicuts, and the Government claim that their rights to water at the Upper Anicut is to all flow up to the limit specified by them.

16. *Proofs on which Madras rely.*—The evidence on which Madras rely to establish their claim are the rules of regulation in force and the water registers showing the actual system of regulation and enjoyment of water for sufficient period prior to the changes made by remodelling the Upper Anicut.

The rules in force at the Upper Anicut during the period are those of 1882 and 1896 (Appendix I). No copies of rules prior to 1882 have been traced, but the water registers for the years 1880 and 1881 show a similar system. The descriptions already given and the record of the gauge-readings at the Cauvery Dam are evidence of the amount of water which passed day by day over that work, while the rules show clearly what distribution of water was made when supplies were below what was desired and capable of material alterations in distribution by the existing means of regulation.

17. *Limited power of regulation prior to remodelling.*—In this connection it is brought to notice that prior to remodelling of works the power of distribution of water at the Upper Anicut was small in comparison with that since obtained. After remodelling the actual distribution serves as good evidence of what the distribution would have been had it been previously feasible.

The necessities of the Lower Anicut System before and after remodelling have also to be considered and also the use of water for the combined purpose of scour of sand from above the Upper Anicut and the supply of water to the Lower Anicut System.

18. *Rules of regulation indicate the system of use and enjoyment.*—It is submitted that the rules and the actual regulation from 1880 to 1910 clearly indicate the constant use and enjoyment by Madras of water for many years prior to the remodelling of works up to the limit flow claimed, and it is asserted that this use is sufficient to establish a prescriptive right to such a flow whenever available. Any diminution of that limit flow would have had the effect of withholding from Madras lands water which they customarily enjoyed.

The fact that under the then existing conditions of the works certain water passed over the Upper Anicut and that a part of this water was passed into the sea does not, as regards this part, constitute non-enjoyment, as it has been shown that the then existing state of the works made the passing of the water a necessary condition to the required irrigation supplies being delivered on Madras lands. Under such conditions the water passed over the Upper Anicut, including any which eventually passed into the sea, was used by Madras.

The water used for scour of sand at the Upper Anicut comes under the same category of user.

Irrigation above the Upper Anicut.

19. *Use of water above the Upper Anicut.*—In addition to the water required at the Upper Anicut, Madras possesses prescriptive rights to water for the many channels taking off from the Cauvery above this work. The following is an approximate statement of Madras irrigation fed directly by the Cauvery above the Upper Anicut:—

	ACS.
(a) Between Bhavani Bridge and the Upper Anicut	94,000
(b) Above Bhavani Bridge	1,000

Details of the distribution of the irrigated areas are given in Appendix III.

20. The channels fed from the Cauvery below Bhavani take off from the Cauvery at bed level and generally have open heads. When the river is high there is no difficulty in getting adequate supplies. When the river is low the supplies are diverted into the channel by construction of long spurs of stakes and brushwood run out from head of channel into the flowing water and serving to divert water into the channel. These spurs are known as "koramboos," and a regular establishment is kept up to construct them and land is reserved for the growth of the brushwood and small timber required for their construction.

These channels, unlike those below the Upper Anicut, continue irrigation throughout the hot weather months, and by means of koramboos the natural flow of the river is diverted for the supply of the late crops and perennial crops. Irrigation during the hot weather is carried on to the extent of flow available, which fluctuates much according to the character of the season, and is lowest generally in the month of March. There is no measure available of the quantity of water used in these channels, which are all of great antiquity and have been taking water as described from the natural flow of the river from time immemorial.

The prescriptive rights of Madras include the supply of water in accordance with custom to these channels, and the limit quantities claimed at the Upper Anicut are the quantities passing down after the channels above have drawn off in accordance with usage the supplies required by them.

21. *Prescriptive right of Madras to hot weather flow.*—For the supply of these channels during the hot weather months, the prescriptive rights of Madras embrace the whole natural flow of the Cauvery less what is drawn off for the supply of the directly supplied channels in the Mysore territory.

22. *Condition for waiving right to hot weather flow.*—With a view of meeting Mysore requirements and recognizing that the water proposed to be continuously passed for power generation by Mysore is to be passed down the river to Madras, the Government of Madras are prepared to waive their prescriptive right to the natural flow of the river in the months of March, April and May and allow the impounding of this by Mysore on the condition that a steady flow of not less than 900 cusecs is passed from Mysore down the river into Madras throughout this period. The estimated steady flow required for power generation by Mysore is 1,000 cusecs, but the amount is reduced to 900 cusecs by Madras to allow a fair working margin.

It is only on condition that this flow is passed on to Madras that Government of Madras consent to forego their existing prescriptive right to the whole natural flow of the river for the months of March, April and May.

23. *The rights of Madras include water according to custom for the irrigation above the Upper Anicut.*—In stating the claims and limits of flow advanced by Madras the claims at the Upper Anicut only have been formulated in terms of specific gauge-readings and equivalent quantities. The reasons are that the regulation of flow has been impracticable at any point in the Madras territory above the Upper Anicut and the rules of regulation therefore only apply to the water required below that point. Evidence of the system of regulation and statements of gauge-readings and draw-off are not available above this, but the existence of rights to a supply for all the channels is clearly established. Madras claims the whole flow of the river up to the limit quantities specified at the Upper Anicut after the customary draw-off for the channels above has been taken from the river, and the claim includes water for such channels.

Mysore Contentions rebutted.

24. *Contentions advanced by Mysore regarding limit flow at the Upper Anicut.*—Having described the conditions of irrigation flow and distribution of the Cauvery water to Madras irrigation and stated the claims put forward by Madras, it is now proposed to deal with those contentions put forward by Mysore in their statements and rejoinder which bear on the second of the terms of reference so far as regards the limit flow of water to which Madras is entitled at the Upper Anicut. The gauge-readings advanced by Mysore as suitable half-monthly maximum limits of flow of the Agunda Cauvery at the Upper Anicut which will conserve unimpaired the rights of Madras (Exhibit My. 2, Rule 1) are re-stated in column 2 of the table following.

These figures appear to be generally based on gauge-readings giving flow equivalent to the average of half-monthly supplies actually passed during twenty years 1890 to 1909 at the Upper Anicut limited to a maximum of 2,300 million cubic feet a day.

These figures are given in column 4. The exceptions to this are the months of July, first half of August and second half of September.

To base the limit of maximum flow of a very fluctuating supply on the amount of the average flow actually realized is obviously to reduce the resulting average flow and reduce the supplies which have been enjoyed in the past.

25. *Table and statistics showing flow under Mysore proposals*—

Half-month	Maximum limit gauge-reading proposed by Mysore	Gauge-readings connoting average supplies of twenty years under limit of column 2	Gauge-readings connoting actual average supply for twenty years limited to maximum of 7-ft. gauge	Gauge-readings connoting average supply proposed, Madras Cauvery Project	Gauge-readings representing average supplies 30 per cent more than those in column 5
1	2	3	4	5	6
June—					
First half	3·5	1·4	3·5	2.9	3·5
Second half...	5.1	4·5	5·1	2·9	3·5
July—					
First half	6·9	5·6	5·7	6·1	6·8
Second half...	6·7	6·2	6·4	6·1	6·8
August—					
First half	6·6	6·3	6·6	5·9	6·6
Second half...	6·6	5·9	6·0	5·9	6·6
September—					
First half	6·2	5·5	5·6	5·8	6·5
Second half...	5·2	4·8	5·2	4·7	5·1
October—					
First half	5·4	4·9	5·4	5·0	5·5
Second half...	5·4	4·9	5·4	4·2	4·7
November—					
First half	5·0	4·4	5·0	3·8	4·3
Second half...	4·4	3·6	4·4	3·8	4·3
December—					
First half	3·9	2·8	3·9	3·0	3·6
Second half...	3·0	2·3	3·0	1·7	2·0
January—					
First half	2·5	1·9	2·5	2·1	2·5

The table above shows in column 3 gauge-readings which would have been realized half-monthly for the same twenty years with a flow limited by the figures put forward by Mysore. In column 5 are given the gauge-readings put forward in the Madras Cauvery Project as suitable for the steady supply (without fluctuation) of the existing irrigation. It is to be noted that the figures in column 4 represent the water actually passed subject to a limit maximum of 2,300 m.c.ft., and this embraces reductions of flow when less quantities than the limit were purposely passed on account of long continued floods or heavy local rain. The figures in the other columns are not subject to any such deductions and are consequently unduly great in comparison.

It will be seen that the figures in column 3 represent great reductions on the corresponding figures in column 4 in all half-months except the first half of July and the second half of August, and in these periods the reductions are material although not proportionately very large. The figures in column 4 represent actual average supplies passed over the Cauvery Dam in twenty years limited to a normal discharge due to a 7 feet gauge-reading. This limit does not embrace the claims or prescriptive rights of Madras as regards occasional extra supply for the Cauvery or the Vennar nor the supplies required for the Veeranam tank and the Lower Coleroon System.

Further, even excluding these considerations, the rights of Madras cannot be limited to any specific quantity based on averages.

The averages include the years of very deficient supply, and the *total* average quantity is not the limit of Madras rights. Madras rights are as claimed based on the whole natural flow up to a certain limit, and the operations of the rules of regulation clearly define the modes of exercising these rights which have been in enjoyment and use for many years.

Under the conditions experienced very deficient supplies were received in certain years, being the result of deficient or badly distributed natural flow, and the fact of such deficiency cannot be held to restrict or reduce the rights of Madras in a year of more abundant or better distributed natural flow.

While, therefore, the figures in column 4 do not represent the full rights of Madras, a comparison of them with the figures in column 3 shows that they represent a much larger flow than what could be realized under the Mysore proposed limits.

Although Madras claims are based on limit flow and not on total quantities used during a season, it is desirable to give a few figures of actual quantities of water which would have been passed over the Cauvery Dam by adopting the Mysore proposals and compare them with the amounts actually passed as shown by the gauge-readings in column 4.

These have been worked out from the total average yearly flow of the twenty years to which column 4 refers from June to January. The total average yearly quantity of water passed from June to January amounts to 253,543 m.c.ft. The quantity under the limits proposed by Mysore (column 2) works out for the same twenty years to 210,920 million cubic feet—a reduction of 42,623 million cubic feet a year or enough to irrigate more than 150,000 acres of land, that is, more than the whole new area proposed to be irrigated by Mysore under their reservoir. Realize further that column 4 does not represent the full extent of Madras prescriptive rights either as regards occasional extra supplies to the Cauvery System or as regards the main source of supply to the Coleroon System, and it will be apparent what disastrous results would necessarily follow the acceptance of the limits proposed by Mysore.

26. *Concerning the admission by Mysore* (*Exhibit My.* 1, *paragraph* 10 .—In this connection reference is made to the Mysore statement (Exhibit My. 1, paragraph 10) in which the following passage occurs making reference to the uniform depths of flow allowed in the Madras Metur Project: "It is admitted that some "allowance should be made on account of the uncertain flow of the river. An "addition of about 25 to 30 *per cent* of the supplies provided in the Metur Project "should be sufficient. . . . ."

This is an absolutely clear and reasonable admission. Sir John Benton, in noting on the matter (Note dated 12th May 1911), makes a similar remark and

says in paragraph 12: "The average *irrigation supplies* vary incessantly with the "flow of the river and, I may explain, to an extent which is unknown as far as I "am aware on large canal systems elsewhere in India. The steady average "supplies which would suffice for the area to be irrigated if a reservoir is provided "are very much less than those which have to be run in order to take advantage "of freshets and floods."

The gauge-readings connoting average quantities 30 *per cent* in excess of those allowed in the Metur Project are shown in column 6.

When the admission made by Mysore was noted by Madras as reasonable, the Mysore Durbar hastened to explain that they had meant that the 25 to 30 *per cent* meant maximum limits and not "supplies" of water. The words used by Mysore do not, however, carry this interpretation. It was stated by them in their rejoinder that, under the rules put forward by Mysore, the maximum flow was limited to gauge-readings shown in column 2 of the statement above, and therefore the meaning intended to be conveyed could not be what was understood by Madras. It is, however, pointed out that the rules were drawn out subsequently to putting in the Mysore statement. The gauge-readings equivalent to average supplies under these limits referred to in these rules are given in column 3. It is asked how "such supplies" can be 25 to 30 *per cent* in addition to those shown in column 5.

The equivalent gauge-readings to supply 30 *per cent* above column 5 are given in column 6.

What Mysore apparently propose is to limit the maximum monthly flow to which Madras has a prior right to the average flow realized monthly for the irrigation supply of the Cauvery System.

27. *Mysore proposals do not conserve unimpaired Madras rights.*—It is brought to notice that the Madras Government have, from the commencement of this controversy, uniformly based their statement of requirements for irrigation of the Cauvery Delta System on a limit flow of 7 feet, and further that in both sets of rules of regulation put forward by Mysore (Exhibit Ma. 1-a) this limit flow is accepted as an equitable basis of settlement throughout the year from June to February.

The Madras Government have felt unable to accede to the principle on which the Mysore rules for regulation were based, and on this ground and on questions relating to losses in transmission, it was found impossible to come to an agreement.

The present proposals of Mysore ignore the admissions made in their previous proposals of the establishment of the 7 feet limit claimed by Madras at the Cauvery Dam.

The limit readings now put forward by Mysore as fully conserving Madras rights are a great reduction on those previously admitted as a suitable basis for agreement. It is believed that these proposals have been shown to be altogether untenable and that they do not suffice to "conserve unimpaired Madras prescriptive rights."

28. *Special allowances for rainfall during the north-east monsoon proposed by Mysore.*—The Mysore Durbar have suggested that special allowance should be made permitting extra impounding in Kannambadi Reservoir on the occasion of heavy falls of rain in the delta (Exhibit My. 1 and Exhibit My. 4, paragraph 9). It, however, admits that it would be difficult to frame rules to make provision for this beforehand. But it is only on the basis of rules made beforehand that extra impounding could be permitted. The contention in this respect advanced by the Madras Government (Exhibit Ma. 3, paragraph 9) is that it is impracticable to frame rules for impounding extra water by Mysore on account of rainfall in the delta which will at the same time fully protect Madras from risk of loss due to such extra impounding.

29. *Considerations governing allowances for rainfall.*—The considerations governing the matter are noted on below.

First, a depth of $\frac{1}{4}$ inch of water per day delivered on the fields is about what will suffice to supply paddy after transplantation is complete.

Thus, a well distributed precipitation of rain totalling to 4 inches will suffice for half a month's supply. The 4 inches must, to serve such a purpose, be all "useful rainfall."

A fall of 4 inches in a single day would not all be useful; indeed, a great deal of it would be harmful.

The greatest rainfall which can be counted as "useful" is 1½ to 2 inches in one day or a sufficient supply for six to eight days. After any fall in excess of this, raiyats are concerned rather in avoiding damage from excess of water and hasten to drain off the rainfall as rapidly as possible.

The excess rain runs off to the sea or stagnates in the eastern swamps and low-lying lands and in no wise assists the supply for irrigation of the bulk of the irrigated valuable lands. If, say, 1½ inches of useful rain falls in one day, this will carry on for six days, a further fall during this period, not exceeding ¼ inch the first day, ½ inch the second day up to 1½ inches the seventh day, will be useful, but excess fall over this will not assist supply.

Now consider how such fall of useful rain can be made to serve Mysore for excess impounding.

The collection of rainfall statistics and the despatch of them to executive head-quarters will be done by midday on the day after the fall, and action on this would be taken at Kannambadi, say, the evening of the day following the rainfall, *i.e.*, on an average 24 hours after the mean time of the fall for each day.

In the stages of river flow customary during the north-east monsoon, October or November, it will take 3½ to 4 days for flow to reach from Kannambadi to the Upper Anicut, while it will take a further day on an average to reach the irrigated area.

Thus, from the time the rain falls till the reduced supply reaches the fields, it will take 5½ to 6 days. Six days is about the limit of time a single fall of rain will supply with full efficiency.

Further, such rain must be widely distributed over the delta.

Using all reasonable expedition, by the time any reduction of supply made on this rainfall reached the delta, the effect of the rain in the form of useful irrigating supply would have expired, and it is only on the effect of subsequent daily rainfall of a useful character well distributed over this large irrigated tract that material extra impounding could be permitted. It is not denied that on certain occasions it might be possible to make certain concessions to Mysore when the fall of rain in the north-east monsoon was *continuous* and well distributed over the whole area.

An examination of records of rainfall in the Tanjore District has, however, shown that such occasions did not in the past twenty years arise in any of the years during which such assistance would have been useful to Mysore.

30. *Allowances for rain impracticable.*—The matter is so complicated and the time of transmission so great that the formulation of workable rules regarding allowances for rainfall is not practicable.

The Mysore Government have been unable to formulate any rules which would serve as a guide to regulation on this matter, and the statement made that "it will be easy to frame rules after a term of years" is not supported by any argument whatever and cannot be accepted.

31. *Reference to Madras Project as regards rainfall.*—With regard to the Madras project, although the Madras Reservoir site is only half as far from the Upper Anicut as Kannambadi, it was found impracticable to formulate any rules for taking advantage of rainfall, although under the much easier conditions of this case the belief was expressed that advantages might occasionally be taken of rain-fall to reduce supplies passed down (Madras Cauvery Project, Volume I, paragraph 62).

In such a case any undue reduction of supply could be rectified within four days by issues from the water impounded in the interest and at the call of the area affected.

32. *Conclusions as regards rain-allowances.*—In the case of impounding by Mysore the right of call would not exist, while, even if it did, the distance of that work requires a harmful lapse of time before delivery of compensation water.

The Madras Government adduce the above considerations to support their contention (Exhibit Ma. 3, paragraph 9) that "it is impracticable to frame rules for allowing a reduction in issue at the Mysore Reservoir in consequence of rainfall in the irrigated area."

33. *Specific supplies required for Coleroon System.*—The Government of Mysore have stated that a claim to specific supply for the Coleroon System including the Veeranam tank and anicut is untenable, because *under the present conditions* no regulated supply is under ordinary circumstances passed to the Coleroon System (Exhibit My. 1, paragraphs 11 and 12). The sources of supply to the Coleroon System and the Veeranam tank have been already described in considerable detail (paragraphs 35 to 41, Part II).

It is there shown that, under existing conditions, the Vadavar irrigation can only be adequately supplied from the Coleroon when a considerable quantity of water is being passed over the Lower Anicut. This connotes necessity for not infrequent freshes and floods which under existing circumstances are passed down the Coleroon.

The water passed to the Coleroon under existing conditions is not a specific regulated quantity but constitutes all floods and freshets, and until the Veeranam tank is full all such flood water is actually used and enjoyed.

It is only when the Veeranam tank is full that flood water passed by the Lower Anicut is not used and enjoyed.

34. *Discharge of 150-yard calingulah.*—Further, in addition to leakage, percolation and freshes, unregulated and uncontrolled supplies of water pass over the 150-yard calingulah from the Cauvery into the Coleroon, as noted below, whenever the Cauvery Dam passed 5½ feet of water or upwards:—

Gauge. Cauvery Dam.	Approximate water passing over 150-yard calingulah. CUSECS.
5½ feet	38
6 „	492
6½ „	1,030
7 „	1,584
7½ „	2,215
8 „	2,912
8½ „	3,669
9 „	4,483

Mysore contend that a considerable proportion of the freshes and floods now enjoyed, which now are the main sources of supply of the Veeranam tank and a considerable source of supply to the rest of the Lower Anicut irrigation, may be impounded at Kannambadi and yet no allowance or specific supply should be given in place of these.

Even under existing circumstances the conditions of supply of the Vadavar are unsatisfactory, and if the floods and freshes which are at present in the enjoyment of Madras are impounded, it is absolutely necessary that in their place a specific supply should be given.

It is desired here to correct an error in Madras reply to paragraph 12 (Exhibit Ma. 3.); the catchment area 95 square miles should be 256 square miles.

The correction does not affect the argument or inference to be drawn.

35. *Further remarks regarding past correspondence and claims.*—The statement in the Mysore rejoinder (Exhibit My. 4, paragraph 12) that "now the Veeranam tank has been brought in for the first time besides the Coleroon irrigation" is no doubt made by the Mysore Durbar in ignorance of the fact that the Veeranam tank and the irrigation under it forms part of the "Lower Coleroon Anicut System" and the area under the tank is over 46 *per cent.* of the whole area irrigated by the system.

It has already been pointed out (Exhibit Ma. 3, paragraph 12) that from the first the Mysore Durbar were informed that the 7 feet gauge limit did not include supplies for the Coleroon irrigation and that it would probably be necessary to make further demands for this. As the Veeranam tank ayacut forms a very considerable

proportion of the whole "Coleroon irrigation" it is clear that the statement of Mysore that a claim for this is now put forward for the first time is incorrect. The necessity for an allowance for the Lower Coleroon irrigation including the Veeranam tank and its ayacut has been dealt with above, and it is submitted that the Madras rights to water for this are supported by very convincing facts and figures.

It is considered desirable, however, to explain why no specific claim to special extra water for the Lower Coleroon System or occasional extra supplies above the 7 feet limit for the Cauvery Delta System was made, in the tentative rules for working the smaller reservoir (Appendix VII) put forward by the Chief Engineer for Irrigation, Madras, as an enclosure to demi-official letter to the Resident of Mysore of 22nd November 1911, as the prescriptive rights of Madras are the same whatever the size of the Mysore Reservoir be.

The reason is that it was considered that, under the small capacity, 11,030 million cubic feet, and the small area of new irrigation, 25,000 acres, to which Mysore undertook to limit this small scheme, there would be still available at the Upper Anicut in sufficient number and quantity the occasional freshes giving opportunities of passing extra supplies to the Cauvery Delta and for the supply of the Coleroon irrigation including the Veeranam tank.

Under the conditions of the small scheme, it was unnecessary to burden the rules with those extra restrictions and complications for safeguarding Madras supplies which are, however, quite necessary in the case of the large reservoir, which constitutes a formidable danger to the prosperity and rights of Madras irrigation.

36. *Regarding Mysore statement that "the floods of the month of June are mostly allowed to run into the sea."*—This statement (Exhibit My. 1, paragraph 30) is made on the authority of the Revenue Officer's report, Madras Cauvery Project, Volume I, page 87, paragraph 82. What is here said is the "early freshes" are not wholly utilized and probably run to waste or are uselessly absorbed in the channel beds.

Again Mysore quote from Volume I, page 4, paragraph 16 : the relevant remarks are quoted at length :—

"15. *Conditions of irrigation water-supply.*—As will be seen from the map, "the Cauvery enters the delta at the narrow western corner or neck and its waters "are distributed over an ever widening expanse of country on their way to the "sea. The volume available in the channel is consequently much reduced as they "proceed eastwards, and the porous nature of the soil in the more northernly part of "the tract tends to still further diminish the supply by absorbing large quanties of "water. This is especially the case when the first freshes come in June after the "country and its water-courses have been dry for many weeks. As is only to be "expected, therefore, the land towards the west receives a much earlier and abundant "supply than that towards the coast. The supply of the later portion of the delta "would indeed be very deficient if it were not for the fact that the porous character "of the soil already referred to enables it to store up a considerable quantity of the "river supply which afterwards drains out and is partly given back to the channels "in the form of spring water for the benefit of the lower land . . . ."

16. "*System of rice cultivation.*— . . . . Seed-beds are usually watered "either by early freshes in the river or water is obtained for them by baling from "wells or spring channels. Any water in the river in excess of what is necessary for "seed-beds before the time of transplantation generally runs to waste as the ryots "object to using it on their fields or wetting them until just before transplanting. "They prefer the ground to remain dry and get thoroughly ærated.

"17. *Double crop lands.*—In this portion of the delta, it is customary . . . "to transplant the first crop (a short one) as soon as possible after the arrival of the "early freshes in June so that it may be harvested in September before the break of "the north-east monsoon . . . ."

The extensive quotation given indicates that the expression "generally runs to waste", which is quoted by Mysore, does not literally mean that the water serves no useful purpose, but that it is not wholly utilized on the lands if arriving before the ryots have sufficient seedlings ready for transplantation. The water is not under such circumstances run on to fields and it pours down the delta net-work of channels, being absorbed into the bed and adjacent sub-oil and fills up the interstices in the

sandy bed and the porous sub-oil. It is absolutely necessary, before water can pass down a porous sandy bed, that the interstices of the sand should be filled up, and this takes enormous quantities of water. In the Madras Project, during the month of June, an allowance of 50 per cent. of the whole supply issued from the reservoir was allowed for wastage by absorption on this account (Volume III, page 43.) In one sense this water is wasted, but as such wastage is an essential condition of irrigation, it is as a fact "used" although the benefit is not visible. It is usual to talk of water lost by absorption as wasted, but such wastage is a necessity and water for this purpose is as much one of the rights of user as water run on to the fields.

If the water received in June is not all run on to the fields, it is still used and serves a useful purpose. The above-quoted paragraphs, moreover, show the importance of early transplantation of the first crop so that it may be ready to harvest in September and state that "it is customary to transplant as soon as possible after the arrival of early freshes."

The statement of Mysore that the "floods of June" are mostly allowed to run "into the sea" is thus shown to be incorrect.

37. The two places where the freshes coming down the Cauvery in June can be deliberately surplused are at—

(*a*) The Upper Anicut.

(*b*) The Grand Anicut.

(*a*) *The Upper Anicut.*—In the first half of June, it is found that in the twenty years, 1890 to 1909, the Upper Anicut surplused only two years.

In 1893, a small quantity, 362 million cubic feet.

In 1909, a large quantity, the reason for which is stated later.

(*b*) *The Grand Anicut.*—Water was passed through the Grand Anicut in five years.

38. The following table shows the recorded discharges in the first half of June of the Upper and Grand Anicuts and the Cauvery and the Vennar:—

Table of discharge in million cubic feet for the first half of June for the years from 1890 to 1909.

Years	Discharge at the Cauvery Dam	Discharge into the Coleroon over the Upper Anicut	Grand Anicut discharge	Combined discharges of the Cauvery and the Vennar
	M.C.FT.	M.C.FT.	M.C.FT.	M.C.FT.
1890	5,224	Nil.	Nil.	2,257
1891	6,345	...	...	3,520
1892	8,032	...	...	4,048
1893	13,541	362	4	11,233
1894	6,807	Nil.	*	*
1895	3,306	...	Nil.	175
1896	4,250	...	...	822
1897	5,662	...	...	2,220
1898	4,030	...	*	*
1899	4,096	...	1,573	129
1900	3,979	...	...	1,694
1901	4,910	...	...	3,272
1902	3,568	...	1,726	288
1903	5,786	...	Nil.	3,441
1904	15,207	...	3,702	7,138
1905	4,336	...	Nil.	2,292
1906	692	...	...	343
1907	5,066	...	2,594	1,138
1908	2,382	...	Nil.	2,817
1909	21,577	20,722	6,659	803

* Information not recorded.

The year 1909 was an exceptional one. Work had been going on in April and May on the right abutment of the Grand Anicut which had been found to be in a very dangerous and unstable condition. It was desirable to raise water slowly and not head up water suddenly on the work and this especially in the first freshes. In June, the freshes were abnormally early and abnormally heavy and water was freely passed into the Coleroon over both the Upper and Grand Anicuts and into the Cauvery and the Vennar. Throughout the year, there was abnormal regulation in consideration of the state of this work. As a fact the anicut did fail in July, three arches at the right end collapsing.

In 1899, 1902 and 1907 the repair works were backward and water was kept out the Cauvery and the Vennar till near the middle of June. While such an occurrence is regrettable and points to failure in carrying out repairs expeditiously, it in no way affects the prescriptive right of Madras.

In 1904 large quantities of water were passed into the Cauvery and the Vennar, *viz.*, 7,138 m.c.ft. The reasons for not passing down more water are not recorded. However this may be, the omission to occasionally use the entire flow of the first half June constitutes no valid interruption of the rights of user, and further the above statistics show that the allegation that the greater part of the flow of the early freshes is wasted as regards the first half of June is incorrect.

39. The conditions of the second half of June may be considered with the help of a similar table.

Table of discharges in million cubic feet for the second half of June for the years from 1890 to 1909.

Years	Discharge at Cauvery Dam	Discharge into the Coleroon over the Upper Anicut	Grand Anicut discharge	Combined discharges of the Cauvery and the Vennar
	M.C.FT.	M.C.FT	M.C.FT.	M.C.FT.
1890	9,133	Nil.	Nil.	7,948
1891	6,130	...	...	3,246
1892	11,258	308	35	6,826
1893	30,406	9,342	698	24,507
1894	18,081	2,020	*	*
1895	28,372	18,316	8,689	19,364
1896	40,094	41,154	19,378	24,799
1897	35,457	27,851	8,435	26,799
1898	21,402	6,080	*	*
1899	21,183	11,880	3,374	15,828
1900	20,903	6,200	96	21,443
1901	20,753	4,791	Nil.	22,652
1902	8,452	92	...	7,174
1903	9,558	Nil.	...	8,151
1904	31,637	27,211	11,403	19,855
1905	8,246	Nil.	Nil	7,559
1906	4,076	657	...	2,818
1907	14,807	Nil.	1,515	10,410
1908	5,270	...	Nil.	6,704
1909	15,447	8,897	2,852	15,974

* Informanion not available.

As regards the water passing over the Upper Anicut, this was, except in 1909, most of it involuntary surplus, or effected in accordance with the existing rules of regulation; and under the limiting conditions for impounding by Mysore proposed by Madras, the greater part of this, as well as much of the excess involuntarily passed over the Cauvery Dam and discharged at the Grand Anicut into the Coleroon would have been available for impounding by Mysore. Reference to the daily discharges at Sivasamudram or Bhavani Bridge for the second half of June in the

years 1893, 1895, 1896, 1897 and 1904 will clearly demonstrate this. Further, in the case of discharges over the Grand Anicut, it will be seen that, speaking generally, these are only passed when the supplies to the Cauvery and the Vennar have been good.

Out of the nineteen years considered, leaving out the exceptional year 1909 and neglecting amounts under 2,000 million cubic feet in the half month, surpluses have only been passed in months in which the supply passed to the Cauvery has exceeded 19,000 million cubic feet.

The passing of such supplies does not indicate any disposition to waste the early freshes of June into the sea and it is claimed that the figures produced altogether refute the Mysore suggestion of neglect of use of the early freshes.

40. *Remarks regarding discharges recorded.*—It is to be realized that these figures are extracted from the totals of daily discharges compiled and recorded as a matter of routine, Exception can be taken to the formulæ and assumptions on which many of these computations are made, and the figures cannot be taken to be more than a rough indication of the actual discharges, Re-calculating the whole of these discharges would be an undertaking involving immense labour and much time, while the results would be open to the imputation of having been settled and compiled for the purposes of this case. On the whole, it has been thought best to let the figures on record stand with the qualification noted above.

An exception to the above are the discharges extracted from the Madras Cauvery Project which are the results of carefully conducted gaugings and can be relied on.

41. *Areas irrigated below the Upper Anicut.*—The Mysore Durbar have suggested that Madras rights are limited by some specific area of land irrigated and which it has been the custom to irrigate. The Madras Government altogether deny that their rights are so limited. It, however, simplifies the consideration of the matters at issue to state that for many years the areas irrigated by the Cauvery in Madras have not materially altered and that only seasonal fluctuations of area have occurred.

A diagram is attached showing the areas charged as irrigated year by year from 1866 in the Cauvery and the Coleroon Delta Systems.

In addition to this, there are channels taking off from the Cauvery between the Cauvery Dam and the Grand Anicut irrigating approximately 6,760 acres.

42. *Sir John Benton's Note of 12th May 1911.*—The Madras prescriptive rights are established by the rules of regulation actually in force from time to time, with corroborative evidence extracted from water registers as regards the actual methods and practices of user. It is on such facts rather than on expert opinion and evidence that Madras base their claims. It is, however, considered desirable to invite attention to and request perusal of Sir John Benton's notes of 12th May and 28th July 1911 on the subject of the matters now under arbitration. This officer was in the position of an impartial expert whose opinion on the matter was sought by the Government of India, while his great eminence as authority on irrigation entitles his opinions to the most careful consideration. These notes with the connected correspondence are printed with the Proceedings of the Madras Government No. 296-I., dated 18th September 1911, and a perusal of the whole will throw much light on the history of the matter prior to reference to arbitration.

43. *Regarding references made by Mysore to the opinions expressed and proposals made in the Madras Metur Project.*—It is to be clearly understood that expressions of opinions and forecasts made in the reports of the Madras Metur project are merely opinions and proposals, and are not facts. The Mysore Durbar have attempted to make capital out of the higher duties of water proposed to be worked to after the construction of the Madras Reservoir. It is, however, on existing conditions and existing modes of use that this case has to be considered. The proposals for the Madras Project relate to very different conditions and it is possible that they may fall short of realization when actually put to the test.

It is however, believed that the duties allowed will, under the conditions of steady and assured supply, prove adequate, and should the Government of Mysore offer as a compromise the passing to Madras from their impounded supplies water

which will assure such a regulated and unfailing supply and give proof of their ability to give effect to such an arrangement, the Government of Madras are prepared to entertain the offer.

44. *Summing up of Madras claim.*—The Madras Government claim that the interests of their ryot population shall receive full protection and, to quote the words of the issue framed, that their prescriptive rights shall be "conserved unimpaired."

Summing up, the Government of Madras advance that the reply to the second issue should be:—

(*a*) The extent of the prescriptive rights of Madras as against Mysore embraces a title to all the natural flow of the Cauvery under existing conditions at all times when the Veeranam tank is not holding 918 m.c.ft. of water.

When the Veeranam tank contains 918 m.c.ft. of water, the rights of Madras are to the whole natural flow of the Cauvery which was necessary under the conditions existing prior to remodelling the Upper Anicut in 1899 to secure a flow of depth of 7 feet over the Cauvery Dam with the under-sluices of the Upper Anicut closed.

(*b*) The Government of Madras claim that to preserve their rights unimpaired, it is necessary to pass down to them the whole natural flow of the river up to a limit flow which, when measured at the Upper Anicut, amounts to 2,944 m.c.ft. per 24 hours.

Exhibit Ma. 9-a.

Information asked for by the Arbitration.

"Population affected by irrigation below the Upper Anicut."

The population of the villages irrigated by the Cauvery Delta and Lower Anicut Systems is 2,200,000 excluding Karikal, which is French Territory.

The figures have been taken from the 1911 Census Report.

W. M. ELLIS, COL., R.E.,
Representative of the Govt. of Madras.

25th October 1913.

Karnataka State Archives
Departmental Library
Acc. No.

Exhibit Ma. 10.

THE MADRAS CASE.

PART IV—ENGINEERING ARGUMENTS—THIRD ISSUE.

1. Under this head have to be considered—
   (*a*) the principles, and
   (*b*) the actual rules

under which the discharges at the Kannambadi Reservoir can be best regulated in a way which will ensure to Madras full protection of their prescriptive rights.

2. *Principles of regulation.*—To consider first the principles, that is, the general system of regulation unhampered by figures representing exact quantities. Each party has formulated a system, and in addition a request made by the Assessor for certain investigation of discharges under certain lines foreshadows the possible suggestion by the Arbitrator of a third system.

3. *The Mysore system.*—The system advanced by Mysore is one permitting impounding at Kannambadi on any day of the whole or some portion of the flow, and if it is found by measurement at the Upper Anicut "*d*" days later that such impounding has deprived Madras of some of the water to which she was entitled, Mysore is then at once to issue this amount as "compensation water" from the Kannambadi Reservoir on receiving by wire such intimation.

It is assumed above that "*d*" days is the time of transmission or flow of water from Kannambadi to the Upper Anicut in those stages of flow which will suit the general flow conditions under the circumstances described.

4. *Remarks regarding the Mysore system.*—The system proposed by Mysore, although at first sight appearing reasonable, involves computations of a complicated nature and, in addition, does not ensure to Madras full protection of her prescriptive rights. Putting aside for the moment a certain difficult question concerning loss in transmission on compensation water, such a system as indicated has the following disadvantages.

As the time of transmission is "*d*" days, the time which elapses between excess impounding by Mysore and receipt of compensation water, is "2*d*" days.

This connotes the receipt at the Upper Anicut "*d*" days after the date of natural flow, the supply of compensation water in lieu of that of which Madras was deprived. While, in time of low natural flow and with a falling river, such compensation supply may, and frequently would, prove very useful and under certain and not infrequent circumstances would recoup Madras for the deprivation inflicted "*d*" days previously, under other also not infrequent circumstances, generally on a rising river, such compensation supply would give an excess over the limit quantity required by Madras and have to be surplused into the sea.

More frequently, the compensation supply, while not being surplused, will cause fluctuations in the incidence of flow at the Upper Anicut materially greater than the natural flow fluctuations.

Already the fluctuating nature of the natural flow at the Upper Anicut is a cause of inconvenience and militates against economy in the use of water.

Material increase in such fluctuations, which is inherent in the system of regulation proposed by Mysore, is most strongly objected to and is an infringement of the rights of Madras.

The loss of compensation water which must be surplused further deprives Madras of water to which she has prescriptive right.

5. *Main objections to the Mysore system.*—On three grounds, therefore, the principles of regulation proposed by Mysore, are objected to—

(*a*) The system does not secure to Madras the quantities of water to which she is entitled.

(*b*) The system alters, in a manner unfavourable to irrigation supply, the natural distribution and fluctuations of flow.

(*c*) The system is a complicated one and likely in practice to prove fruitful of disputes and misunderstandings.

An exposition of the practical working of the system, and of the fluctuations of flow to which it gives rise, will be given later when considering the working of the rules advanced by Mysore (Enclosure to Exhibit My. 2).

The question of loss in transmission on "compensation water" will also be considered later.

6. *The Madras system.*—The system of regulation proposed by Madras is based on the actual frequent measurement of flow of the principal rivers which, combined, make up the flow of the Cauvery in Mysore. Except the Kabbani, all these rivers join the Cauvery above the dam site. The Madras Government propose the actual frequent (or continuous) measurement of the inflow into the reservoir and also of the Kabbani river. The places of measurement must be above the waterspread of the Mysore Reservoir, and the place of measurement of the Kabbani must be such that the flow measured must synchronize with the flow of the other measurements.

7. *Remarks on the Madras system.*—Under such a system of constant actual measurement, the total flow of the Cauvery in Mysore will be known in time to allow Mysore to impound any excess in that flow over what is due to Madras, and to so regulate impounding at the Kannambadi Reservoir as to pass down the river sufficient water, allowing for losses in transmission, to secure to Madras at the Upper Anicut the full flow to which she is entitled.

Subject to a suitable allowance for loss in transmission, such a system can absolutely secure unimpaired Madras rights both as regards quantity and incidence of flow.

If there were no losses or gains in transmission, this system would give to Madras without risk of any failure the water to which she has a right. As, however, losses and gains in transmission occur in an irregular manner which cannot be foreseen or calculated in advance, it is necessary to make such percentage allowances to cover risk of loss as will ensure that Madras shall be fully safeguarded. It is only by comparison of recorded daily and monthly flow, under the circumstances which have occurred in a series of years of various characters, that a reasonable estimate of the percentage necessary to secure the rights of Madras can be made. Under the Madras proposals, if C be the percentage allowed for loss in transmission, R the measured inflow into the Mysore Reservoir, K the discharge of the Kabbani, L the limit flow to which Madras is entitled at the Upper Anicut, then Mysore must pass daily for Madras use either the whole inflow into the reservoir or $\left(\frac{100}{100-C} \times L\right)$ whichever is least. Mysore may thus impound any excess of the combined flow $R + K$ over the quantity represented by $\left\{\frac{100}{100-C} \times L\right\}$. Subject to a suitable fixing of C this system is one which would *fully secure Madras rights.*

8. *The third system of regulation*—The system foreshadowed in the investigation which the Assessor has asked both parties to consider is the fixing of a proportion (P) which the daily flow of the Cauvery into the Kannambadi Reservoir (R) bears to the daily yield of the river at the Upper Anicut.

If L is the limit flow due to Madras at the Upper Anicut, under this system, Mysore would be allowed to impound on any day the amount by which the inflow at Kannambadi exceeded ($P \times L$).

9. *Remarks on the third system of regulation.*—Such a system has the great merit of simplicity, but the difficulty is to fix such a value for P as will, while fully safeguarding the rights of Madras, not unduly limit impounding by Mysore.

The method is similar to the Madras system, but more simple in that it eliminates the daily measurement of the Kabbani. In other respects it is the same as that system. If the Kabbani and the Cauvery confluence were above the dam site, the system now considered would be precisely the same as that proposed by Madras. Provided that a suitable proportion can be fixed, the difficulties in connection with gains or losses in transmission are eliminated. It is, however, in consideration of these losses that the fixing of P is so difficult a matter. The difficulty in fixing a proportion appears to be materially increased under conditions which leave out the measurement of so important a contributor to the flow as the Kabbani; but the Government of Madras do not desire to oppose such a system of settlement, provided the proportion fixed fully safeguards their existing interests.

10. *Measurements common to all systems of regulation.*—All the three systems require for their working frequent or continuous measurement of the flow into the Kannambadi Reservoir by gauging, at selected stations above the waterspread, the discharges of the rivers, Cauvery, Hemavathi and Lakshmanatirtha.

The sum of these measurements will represent what the natural flow of the Cauvery at Kannambadi would have been under conditions existing prior to the construction of the reservoir.

11. *New irrigation above the Mysore Reservoir.*—It is here necessary to bring to notice a matter affecting the natural inflow into the Mysore Reservoir, a measurement of which is the most important factor of every system of regulation mentioned above.

After a good deal of pressing, it is admitted by Mysore that the Durbar have in contemplation, if not in actual execution, a scheme for largely extending "direct flow" irrigation on the rivers flowing into the reservoir, above the waterspread of that work.

It is well known that in the absence of storage the limits of safe direct flow irrigation in these upper waters of the Cauvery have been reached, and the extension of irrigation in the tracts above the reservoir has been considered and refused because any such extension would prejudicially and materially affect the prosperity of the Mysore cultivation below.

There is no question about there being plenty of water for "direct flow" and water to spare during the months of July, August and September, but after this the flow of the Cauvery dwindles. Even for a single wet crop, water is required up to December, and the measure of the area of secure cultivation under the "direct flow" system is the quantity of dependable flow in the months of November and December. Under existing conditions the limit of the area of the "direct flow" irrigation by Mysore has been already reached, and no material extension is safe except by means of, or by help of, a storage system.

Proposals for such a system are now the subject of consideration by this Arbitration Committee.

It will be clear that, with the assistance of the impounded water in the Mysore Reservoir, it is practicable to give adequate and suitable supplies to all cultivation, whether old or new, lying below the reservoir, subject to the capacity of the reservoir and the water impounded being adequate. In such a state of affairs, Mysore proposes to extend irrigation above the reservoir, supplying such irrigation from the direct flow of the river, which flow prior to the reservoir construction was in the months of small seasonal discharge allocated and required for the supply of the existing irrigated areas below the Kannambadi Dam site. The proposals involve the supply of the latter area from the impounded water in the new reservoir. Thus, the area of irrigation above the dam will be limited only by the limit of seasonal flow of the river supplying it in those months of irrigating season when the seasonal flow is low.

In short, subject to suitable conditions of capacity of the Mysore Reservoir, the limit of possible cultivation above the dam is now increased by the area of old cultivation below the dam, and the old cultivation can be secured by the issue from the reservoir of water impounded in the period of more abundant flow.

It will be clear from this that the increase in area of irigation above the reservoir affords a measure of the area of old irrigation below the reservoir which is under the new conditions made dependent on that work.

12. *How Mysore new irrigation affects Madras.*—It may be asked, even if this is so, how, provided the rights of Madras are fully protected, this affects Madras.

It affects Madras in this way. All the systems of regulation propounded are based on the measured inflow into the reservoirs of the three rivers Cauvery, Lakshmanatirtha and Hemavati. The extension of irrigation rendered possible above the reservoir by the construction of this work will have the effect of materially reducing this flow if the off-takes are above the place of measurement. That is, through the instrumentality of the reservoir, the natural flow of the river to the whole of which up to a certain limit Madras has prescriptive right, is reduced by draw-off above the place of measurement.

It may be argued that the flow is not reduced as the draw-off above is only substituted for the draw-off for old irrigation below the reservoir, and this is admitted.

Such an argument, however, involves adding to the limit flow to be passed through the Kannambadi Dam an allowance for the extent of draw-off required for all new irrigation above the reservoir as well as for any actual new irrigation below the reservoir which is supplied by draw-off direct from the river.

If the total draw-off for such new irrigation is "N" million cubic feet daily, the limit of impounding in Mysore under the third system would thus require to be $(PL+N)$ in place of PL.

Failing this, it would be from the daily flow legitimately due to Madras that the new irrigation above the Mysore Reservoir would be supplied.

The Mysore Durbar argues that the extension of irrigation suddenly undertaken above the reservoir has no connection or concern with the project under consideration. This is denied. The extensions are only rendered possible by the construction of a storage reservoir as already explained. There will be a considerable area, between 6,000 and 8,000 acres, of wet cultivation now fed by direct flow of the Cauvery submerged by the new reservoir; it is legitimate for Mysore to introduce new irrigation to the same extent as regards area and period of irrigation without being on this ground subjected to any hindrance.

It is, however, claimed by Madras that to the measure of inflow into the Kannambadi Reservoir an allowance should be added for the draw-off of all new irrigation taking off direct from the river in excess of this area.

The above consideration is of material importance in considering Madras rights.

13. *No examination of the third system of regulation now proposed.*—As no definite proposals based on the principle of the third system of regulation have been formulated, no further criticism and examination of this system is here proposed.

14. *Additional daily measurements required for the Madras and Mysore systems.*—As regards the systems of regulation proposed by Mysore and Madras in addition to the measurements of inflow into the reservoir, the following additional measurements are required to be made frequently or continuously:—

On the Mysore system, measurements of the flow of the Agunda Cauvery at the Upper Anicut.

On the Madras system, measurement of the flow of the Kabbani is necessary at a point where this flow will synchronize with the measured flow of the three rivers discharging into the Mysore Reservoir.

Such measurements entail very careful gaugings of the streams and graduation of gauges, but do not connote the possibility of any very material errors or any extreme difficulty.

15. *Definite factors to be fixed in framing rules.*—It is necessary, in framing rules for working the Mysore and Madras proposals, to fix definite figures to fill the place of the quantities d=time of transmission in the Mysore proposals, C=percentage of gain or loss in transmission in the Madras proposals.

Further, a percentage (t) of loss in transmission on compensation water has not been considered in the system proposed by Mysore, and consideration of this loss cannot be eliminated.

16. *Loss or gain in transmission.*—Taking up the consideration of losses or gains in transmission relating to the Madras system, it is admitted that the subject

is a difficult one and there must be much uncertainty, and doubt regarding several of the points which have to be considered even if all the figures of discharges which are to be used in the presentation of the case are established on a secure basis.

17. *Unreliable basis of Sivasamudram discharge computations.*—The matter is much more complicated from the knowledge, which is only recently acquired, that the figures of daily discharges past Sivasamudram which have been furnished by the Mysore Durbar to Madras are unreliable. These figures, as lately as April last, were officially stated by the Dewan of Mysore, himself a distinguished hydraulic engineer, to be accurate except for high floods, while at the discussion held in Ootacamund at the end of May these discharges were put forward by the Dewan as the basis for examination of the working of a system of regulation proposed by him, and no indication was then given that the discharges were considered inaccurate.

18. *Inspection of Sivasamudram Anicut.*—The Sivasumudram Anicut was visited in June last by Col. Ellis, and from the inspection made it was at once apparent that the discharges on the basis of computation adopted must be inaccurate and excessive for all high stages of flow. The limit of reasonable accuracy appeared to Col. Ellis to terminate with the stage of flow in which the main anicut becomes submerged. It appeared to him probable that this stage would occur somewhere between gauge-readings 2½ to 3 feet, the gauge-reading at the time of his visit being 2·1 feet. This differs very greatly from the estimate furnished by the Chief Engineer, Mysore (the present Dewan), to the Joint Secretary to the Government of Madras in his letter No. 43 of 28th January 1911. In this, he says: "I also under-" stand that over the greater part of the weir the crest is not submerged until the " head above the crest rises to a height of not more than 6 feet, and the number of " days on which this has occurred is so few that the present discharges may for all " practical purposes be taken as correct."

19. As stated above, Col. Ellis considered that the maximum limit of flow which would enable the Mysore computations to be accepted as probably giving quantities with reasonable accuracy was about a gauge-reading of 2·5, which connotes a discharge of about 47,000 cusecs. The reasons on which this opinion was based are contained in a note and set of calculations made by Col. Ellis in June last which are given in Appendix IX.

It was, however, recognized by him that Sivasamudram was clearly unsuitable as a gauging-station, and the river was inspected for some distance above Sivasamudram with a view to seeing if a more suitable site did not exist. The Danakere Anicut, seven miles above Sivasamudram, was also inspected. A report was then submitted to the Government of Madras pointing out that the computed discharges over Danakere Anicut would be more reliable than those at Sivasamudram, and that orders for fixing gauges above and below this anicut and taking daily readings had been given. Further, it was reported that a fair gauging-site, so far as could be judged from mere visual inspection, existed below the Danakere Anicut, and suggested that it might be desirable in the future to organize a gauging party to work here and to accurately calibrate the Sivasamudram gauge from observations of velocity and flow so made.

From the results of the calculations made (Appendix IX), the view was taken that below 47,000 cusecs the discharges computed by Mysore might be accepted as a basis on which the gains or losses of water in transmission between Sivasamudram and the Upper Anicut might be computed and from the basis of a settlement of the percentage of allowance on this account required to safeguard the prescriptive rights of Madras.

20. *Assessor's inspection of Sivasamudram Anicut.*—Arrangements were made by the Assessor (Mr. Nethersole) to inspect Sivasamudram after the last sitting of the Arbitration Committee. The stage of flow at the time of inspection (10th August) was practically the same as when inspected by Col. Ellis (gauge-reading main anicut, Sivasamudram, 2·1 feet). Mr. Nethersole took the view that there were resulting from the conditions of flow so many possible sources of error that, even for low stages of flow, the quantities computed by Mysore could not be accepted without confirmatory gaugings taken on a run chosen by him below Danakere Anicut.

21. *Velocity observations taken as directed by the Assessor.*—The views of the Assessor were put on record in his memorandum, dated 13th August 1913, and steps were taken to give effect to his wishes. Float observations for velocity were taken and discharge computations made. There were not facilities for very accurate observations nor did the site chosen prove on further investigation so good as it appeared from visual inspection, but it is nevertheless probable that the computations made from velocity observations more nearly represent the true flow than the calculations of Mysore based on Sivasamudram gauge-reading. A table (Appendix X) is given showing the results of calculations of discharges from float observations and the approximate discharge of Sivasamudram for the same main gauge-reading deduced from the figures of daily discharge furnished by Mysore.

22. *Variations in Mysore computations of Sivasamudram discharges.*—In this connection, it is brought to notice that the calculated discharges at Sivasamudram as given by Mysore differ very materially for the same reading of the upper gauge on the main anicut. This is due to the gauge-readings recorded for Kollegal Anicut being quite unconformable with the readings of the main gauge. The reason for this is not understood, but the fact remains. The approximate discharges due to Mysore calculations are obtained by plotting on a diagram a large number of the discharges computed by Mysore for various gauge-readings and from such plotting drawing a representative curve.

The diagram on which this has been done is produced and serves to show the variations existing in Mysore calculations of discharge for the same gauge-reading.

23. *General tendency of results of velocity observations.*—The figures given in Appendix X tend to show that the Mysore calculations give excessive discharges for those stages of flow for which observations have been made.

24. *Tentative figures to be fixed pending accurate calibration, Sivasamudram gauge.*—It is, however, submitted that the gaugings made this year do not embrace, except in the case of two isolated measurements, the stages which principally affect the question, while they were not carried out under conditions ensuring sufficient accuracy.

Under these conditions, Madras are perforce obliged to agree that the figures of Mysore computations should be accepted as tentative only and consider that immediate arrangements should be made for a joint gauging party to work throughout the next flow season and accurately calibrate the gauge at Sivasamudram. It is agreed that any percentage now fixed for loss in transmission shall be liable to revision in accordance with the result of accurate calibration of the Sivasamudram gauge. Meanwhile, Madras urge that the figures of daily discharges at Sivasamudram furnished by Mysore must be accepted as a basis for tentative settlement as these are the only ones available.

The Madras arguments are based on these figures, and the Government ask that, while the arguments and the system of regulation advanced should be finally adjudicated on, any actual percentage figures awarded on account of loss in transmission based on the computed daily discharges at Sivasamudram shall be tentative and subject to revision as soon as next year's gaugings shall put in our hands an accurate calibration of the Sivasamudram gauge, and accurate computations of the flow of past years, for which gauge-readings are available, can be made.

25. *Data for computing losses in transmission.*—The arguments and statistics which follow as regards a suitable measure of the losses in transmission are based on—

(*a*) General considerations and data regarding observations of losses in transmission elsewhere and considerations other than actual computed discharges of the Cauvery.

(*b*) Deductions from the actual computed discharges of the Cauvery and facts relating to the particular river and the case under consideration.

As regards the latter, it is recognized that the discharges at Sivasamudram are unreliable and that any figures arrived at from those discharges are liable to reconsideration. When accurate gaugings of the river have been made, it will be possible to correct, as far as may be necessary, the computed daily discharges which at present are, as regards daily flow of the Cauvery in Mysore, the best and only figures available.

26. *General data regarding evaporation, percolation and absorption in rivers and canals.*—So far as is known, there are no published statements of regular measurements of losses by percolation and absorption in natural rivers, but many experiments on the subject have been made in irrigation canals, and a few statistics on the matter are noted below. They have been extracted from Buckley's "Facts, Figures and Formulæ for Irrigation Engineers." The cases taken have been for canals of large discharge from 500 to 3,000 cusecs. Such discharges are no doubt small in comparison with the discharges of the Cauvery, which would amount normally to from five to twenty times as much, but the results are given in a form of percentage loss or loss per million square feet of wetted area, or per inch vertical per 24 hours, and they may be compared fairly with the Cauvery conditions, bearing, however, in mind that losses are apt to be materially less as a percentage of large discharges than for small ones.

(*a*) Mr. W. L. Strange allows an approximation for "loss in transit" in canals of over 100 cusecs of 0·25 *per cent* per mile, that is 25 *per cent* in 100 miles.

(*b*) Mr. Culchetti gives loss in canals in Italy—

	Discharge	Approximate rate of loss per 100 miles
Naviglio Grand	1,851	10 per cent
Canal Muzza	2,652	15 ,,

(*c*) Mr. Kennedy's experiments on the Bari Doab canal give the following losses in transmission by absorption (including evaporation)—

Channel	Inches, vertical, per 24 hours	Per mill. sq. ft. of water surface c. ft. per second
Main line, Bari Doab canal (sub-soil sandy)	10·4	10
All other branches	2·3	2·2
On distributaries running steadily constant depths	3·4	3·3
On other distributaries	6·1	5·9

(*d*) On the Nira canal (head discharge, 455 cusecs) measurement shows losses in 100 miles of 22 *per cent.*

(*e*) In experiments on the Ganges canal in 181 miles of the length the loss varies from 13·2 to 15·6 *per cent* (by Mr. J. W. Ivens).

(*f*) The following table shows losses on some of the great canals of North India:—

Name of canal	Mileage of canal and branches	Wetted area	Loss in channels	Approximate cusec per mill. sq. ft. wetted
		M. SQ. FT.	CUSECS	
Upper Bari Doab	353	82	820	10
Lower Chenab	426	204	1,632	8
Lower Jhelum	180	78	624	8
Upper Jhelum	136	83	664	8
Upper Chenab	194	145	1,161	7
Lower Bari Doab	196	121	965	8

27. *Allowance for percolation by Sir John Benton.*—The figures of allowances for losses in transmission ordered by Sir John Benton for use in designing new irrigation works in the Madras Presidency (*vide* Chief Engineer's Circular Memorandum No. 1323 of 4th April 1907) are:—

	Per million square feet of wetted area CUSECS.
(1) In gravel or decayed rock	10
(2) Alluvial and red soil	8
(3) Black soil	5
(4) Rock-cutting	3
(5) Tunnels	2

28. *Nature of bed of the Cauvery and reasonable allowance for percolation.*—It is clear that, for the losses by absorption and evaporation in transmission on the Cauvery, a wide and shallow river, very large allowances may be necessary.

In the Cauvery, generally, the proportion of width to depth is much greater than in artificial canals, and this tends to make the area wetted large in comparison to the discharge.

The nature of the river-bed for 180 miles is rock, or rock overlying moderate depths of sand. This reduces losses by percolation and absorption. The rock, however, is fissured and the yield of wells in the vicinity of the margins is good, showing that there is fairly free passage in fissures and through pores of decomposing bands of rock.

Generally, however, percolation will be much lower than in a canal, in ordinary loamy and sandy soil in which a loss of about 8 cusecs per million cubic feet of wetted area is a fair allowance. It is considered that a loss of 3 cusecs in the Cauvery may fairly be considered reasonable.

29. *Computation of loss in transmission on the Cauvery.*—The distance from the dam site, Kannambadi, to the Upper Anicut is 257 miles.

The wetted cross section may fairly be taken as 1,500 feet wide on an average for a discharge of between 15,000 and 26,000 cusecs, and the area of wetted river-bed is thus—

$$5{,}280 \times 257 \times 1{,}500 \times 2{,}035{\cdot}23 \text{ million square feet.}$$

If the loss in transmission is 3 cusecs per million cubic feet, the total loss equals 6,105 cusecs. This is roughly about 30 per cent of the flow.

30. *Losses allowed in the Madras Reservoir Project.*—It may perhaps be suggested that the indeterminate and complex nature of this matter of losses in transmission has caused claims on the Madras side to be unduly inflated.

In order to show that this is not so and that the claims made are in no way inflated for the purposes of this case, it is important to enquire what allowances were made in the Madras Cauvery Reservoir Project for losses in transmission between Metur, the proposed site, and the Upper Anicut, a distance of 116 miles.

The allowances made are recorded in the Madras Cauvery Reservoir Project paper, Volume III, page 32, column 11, of duty tables and areas under—

	Loss in transmission
June	50 per cent
July	20 „
August	20 „
September...	20 „
October	20 „
November	20 „
December	30 „
January	40 „

These centages are on the extra water issued from the reservoir to make up deficient natural recorded flow, and thus "inflow" and "draw-off" are already cut out. They are therefore not on the same basis as the centages which may be allowed including "inflow" and "draw-off for irrigation" in the case under consideration.

They serve, however, to show the unbiassed opinion of the Madras Engineers regarding losses by evaporation and absorption and the allowances made for such losses in their project.

31. *Flow of the Cauvery in Mysore.*—With the exception of the rivers which flow into the Cauvery above Kannambadi, the only river in Mysore which gives a continuous, reliable and considerable supply to the Cauvery in Mysore is the Kabbani.

This river has its sources in the Western Ghauts in a very rainy part of the Malabar district and joins the Cauvery about thirty miles above the Sivasamudram anicut.

The only place below the confluence of the Kabbani at which the Government of Mysore have taken daily gauge-readings for a series of years and have made

computations of the daily discharges of the Cauvery is at Sivasamudram. No continuous records are forthcoming regarding the flow of the Kabbani, and it is only in the form of the daily discharges past Sivasamudram that there is any measure of the daily flow of the Cauvery in Mysore.

32. *Flow of the Cauvery in Madras.*—There is only one tributary of the Cauvery between the confluence of the Kabbani and the Upper Anicut which gives a reliable and considerable flow which can be counted on in a bad year. This is the Bhavani.

The Bhavani has a considerable hill catchment, 1,082 square miles, which gets rainfall in the south-west monsoon averaging about 30 inches; and although this rain is much less than in the hills in Coorg, Malabar and Mysore in which the upper waters of the Cauvery have their source, still the Bhavani can be counted on to pass material contributions throughout most of the irrigation season to supplement the flow of the main river.

Below the confluence of the Bhavani all the Madras channels above the Upper Anicut irrigating some 94,000 acres take off and in months when the rainfall is below the average the draw-off of these, with the losses by absorption, etc., is greater than the inflow from the Bhavani and other minor tributaries, and as a consequence the flow at the Upper Anicut is less than that at the Bhavani bridge.

More frequently, however, there is some gain between the Bhavani bridge and the Upper Anicut, especially during the north-east monsoon.

The gaugings which have been taken show that in the south-west monsoon it is the rule rather than the exception for a material net loss in transmission to be recorded between Sivasamudram and the Bhavani bridge.

33. *Gain or loss in transmission of great importance.*—The matter of the incidence and amount of gain or loss in transmission is very difficult and one of immense importance. The claim of Madras is that the amount of water issued by Mysore at her reservoir must be such as will not involve Madras in any risk of receiving at the Upper Anicut water less than that which constitutes the natural flow, unless this exceeds the quantity to which a prescriptive right has been established.

34. *Place of measurement of issues of water.*—There has been a certain amount of argument as regards the place at which the supplies required for Madras should be measured. Admitting that several methods may be adopted of computation of flow to be passed under varying conditions, it is obviously only at or near the sluices which control the supply, that is, the sluices at Kannambadi, that the measurement of the supply to be passed through those sluices can be made. This being so, the computation of the quantities to be issued through these sluices must obviously include consideration of the allowance to be made for the gain or loss in transmission to which Sir John Benton alludes in his Note of 28th July 1911 under the term "net increase in the river discharge."

35. *"Net increase" of river discharge—a very difficult problem.*—The "net increase," as shown by the recorded discharges, is very fluctuating and is very frequently a "minus" figure.

Under these circumstances, a very complex and important problem is introduced and one of the greatest importance to both parties. Indeed, it is not too much to say that the matter of net gain or loss in transmission, and of dealing with this in a manner which shall fully secure existing interests, is likely to prove the most difficult question which will come before the Arbitrator. It is a matter involving many technical considerations, and it is one involving quantities of water quite sufficient to make the difference between a fair year and a bad one to the immense tract of wet lands which are concerned in Madras; while, on the other hand, it might suffice to make the difference between success and failure of the Mysore Reservoir Project.

36. *Consideration of the question of gains and losses in transmission.*—The only sources of gains in transmission are the run-off from catchments in the Cauvery Basin between the Sivasamudram Anicut and the Upper Anicut.

The causes of losses in transmission are evaporation, percolation and absorption. Considerable losses from these causes occur in all natural streams and rivers.

In addition to such natural causes of loss there is additional loss in transmission from "draw-off" for irrigation.

There is some draw-off to areas irrigated by baling either direct from the river or from marginal wells, but there is no statement of areas so irrigated and there is no reason to believe that the draw-off on this account is considerable. In the case of the direct irrigation, however, the amount of draw-off must be very considerable, and in a bad year losses in transmission due to this greatly affect the total flow of the river which reaches the Upper Anicut.

37. *Gain and loss in transmission from discharge records.*—There are daily discharges at Sivasamudram available for nine years, 1901 to 1909. These discharges have been calculated under the direction of Mysore Engineers. They have been made from the ordinary weir discharge formula $D = 3{\cdot}1\ lh^{\frac{3}{2}}$, but the circumstances of the site are such as to render the results for the higher discharges (over 3,000 to 4,000 million cubic feet per day) certainly too high, and the percentage excess is likely to become greater the higher the stage of the river.

38. *Discharges at the Bhavani bridge.*—There are also daily discharges for twenty years, 1890 to 1909, available at the Bhavani bridge.

These discharges are derived from the readings of a gauge fixed on the bridge which has been read daily throughout this period.

In 1909-10, the river flow was gauged daily throughout the season, June to January, at a suitable site three miles above the bridge and the gauge on the bridge thereby calibrated.

The river-bed both above and below the bridge is rocky and not liable to any material change.

It is unfortunate that no high floods occurred in the year of gauging and that during the highest flood that did occur an accident to the gauging plant resulted in the measurements then made being less reliable than was usually the case.

As a result, only the gaugings up to a level equivalent to a discharge of 7,000 to 8,000 million cubic feet per day are considered thoroughly reliable, while the figures above 9,000 million cubic feet per day are derived from the production of the curve of discharge (Volume III, Madras Cauvery Project Report). They are safe figures of flood quantities for purposes of impounding supply; but they may err rather on the low side, and for flows above 9,000 million cubic feet per day the discharges shown may be somewhat lower than the actuals.

In such cases of doubt, it is submitted that it is necessary to take a *safe figure* and to be careful that any error is on the side of safety.

This course was pursued in the Madras Cauvery Reservoir Project. and it is submitted that, where figures are doubtful, those which err on the safe side should be taken for the purposes of this arbitation.

39. *Discharges of the Agunda Cauvery at the Upper Anicut.*—There is another gauging-station at the Upper Anicut.

The discharges into the right branch are computed from gauge-readings taken daily throughout the period. The gauge (North gauge, Cauvery Dam) was calibrated from a series of daily float and current meter observations taken in 1909-10 from July to January.

The account of these observations and the curves of discharge, etc., are fully recorded in Part II, Volume III, Madras Cauvery Project Report.

40. The discharges of the left branch of the Cauvery through the Upper Anicut have been calculated by sluice or weir discharges in accordance with the conditions existing daily. The details of the methods of computation are given also in the above-mentioned Part II, Volume III.

As in the case of the Bhavani bridge, the graduation of the Cauvery Dam gauge was hampered by the absence of actual gaugings of high floods; and the high stages of discharge over the Cauvery Dam (in excess of 4,000 million cubic feet per day) are obtained from a produced curve, care being taken that any error is probably on the safe side; that is, the result is rather likely to err by giving a smaller flood discharge than the actual.

41. *Gaugings giving a measure of gain or loss in transmission.*—There are thus three sets of gaugings of the river, giving discharges—

(i) At Sivasamudram, 60 miles below the dam site.

(ii) At the Bhavani bridge, 174 miles.

(iii) At the Upper Anicut, 257 miles.

If these discharges are made the basis of computation, there is at once available a record of discharges which show what, during the nine years under consideration, have been the gains or losses of water in transmission between each station.

42. *Diagram of half-monthly discharges and rainfall.*—There is a difficulty in comparing discharges daily as the velocity of flow varies much with the stage of the river so that the time of transmission of water from Sivasamudram to the Upper Anicut, which, in low stages takes about four days, is in high stages reduced to about two days.

For comparing the general conditions of gain or loss in transmission, it has been considered that it is best to compare half-monthly discharges, and a diagram has been prepared showing by half-months the discharges at each of the above stations for the years 1901 to 1909.

It is admitted that this diagram does not show correctly the quantitative aspect of the case. It serves to show the half-months in which there is considerable liability to gain or loss in transmission. The Sivasamudram discharges for high stages of flow are certainly excessive. For discharges up to 4,000 million cubic feet per day, they may be tentatively accepted.

Below this diagram are two others—the first giving the percentage of gain or loss in transmission between Sivasamudram and the Upper Anicut with reference to the former figure and the second similar centages as regards Sivasamudram and the Bhavani bridge, the first representing the losses including draw-off for irrigation and the second excluding this.

Further diagrams are given below showing (1) rainfall in different catchments and (2) rainfall compounded with area of catchment for these catchments, coloured with a shade of green.

For purposes of this latter, the coloured area represents the product—

(*a*) for the hill catchment, of the area of catchment and the inches of half-monthly recorded rainfall;

(*b*) for the plains catchment, of the area of catchment and the number of inches less one, of the half-monthly rainfall. The assumption is in this case that there is no run-off in any half-monthly period in which there has not been one inch of rain.

To this diagram, attention is invited.

43. *Losses frequent in the south-west monsoon between Sivasamudram and the Upper Anicut.*—The diagram shows clearly that throughout the south-west monsoon (June to September inclusive) there is constant liability to material loss in transmission and that no half-month is free from such liability. On the other side, gains in transmission also occasionally occur throughout these months.

44. *Discharges of* 1901 *considered unreliable.*—The rainfall diagrams and catchment area diagrams below clearly indicate the causes of the fluctuating and uncertain conditions. There is a notable exception in the year 1901 in which the uniform gain in transmission throughout the whole period, which is very abnormal, is not supported or explained by record of good rainfall in the catchment in the months of June to August.

Further enquiry has shown that the discharges of 1901 differ vastly from the recorded discharges of all other years for the same gauge readings.

In this year the Sivasamudram Anicut construction works were under execution, and it is admitted by Mysore that owing to this cause the conditions of discharge were constantly varying and the results are therefore of little value.

It is considered that the absence of rainfall in the catchment in this year and the circumstances above recorded justify the flood discharges of the year being regarded with great suspicion.

142

In all the other cases the comparisons of discharges follow reasonably on what might be expected from the diagrams of rainfall.

45. *Conditions of inflow.*—In considering the problem, attention is directed to the matter of inflow from tributaries. There are three large tributaries to the Cauvery, *viz.*, the Bhavani, the Noyel and the Amaravati, and a lesser but still considerable stream, the Tirumanimutar. Were the natural flow of these streams unobstructed and not utilized, it would be reasonable to expect that they would, even in bad years, contribute materially to the flow of the Cauvery and that the inflow would generally be greater than the draw-off for the 94,000 acres of direct flow irrigation from the main river lying between the Bhavani bridge and the Upper Anicut. The conditions of run-off are, however, altogether altered by the fact that on all these streams there exist highly developed systems of "direct flow" irrigation and that the areas irrigated (see margin) are approximately the maximum areas of irrigation under each river, capable of fairly assured supply.

		Acres.
Bhavani	...	32,400
Noyel	...	15,800
Amaravati	...	48,600
Tirumanimutar	...	5,200
Total	...	102,000

Across the smaller tributary streams, there are also many small anicuts feeding small patches of direct flow irrigation and occasionally diverting water into tanks.

Reference to the catchment area map will make the actual state of affairs clear.

From the above, it results that it is only in times of heavy rainfall that any considerable quantity of water is fed into the main river from the principal tributaries, and until the catchment discharges exceed a certain considerable amount there is no surplus available at the confluence of the rivers with the Cauvery to reinforce the flow of the main river. The Bhavani is generally an exception to the above statement, as considerable flow is generally running from the middle of June on into November over the Kalingarayan Anicut.

In times of heavy rain in the catchment, however, the excess over what can be taken by the irrigation systems is surplused into the Cauvery, and floods at the Upper Anicut largely in excess of what are passed at the Bhavani bridge result.

The conditions described above are likely to connote great and sudden fluctuations in the water-levels in the Cauvery, much more marked fluctuations than would occur were the river and tributaries unobstructed and the whole natural flow free to run down to the Upper Anicut. It would be an extraordinary thing in nature, if a river of considerable catchment, such as the Amaravati or the Bhavani, which was discharging at its confluence with another 20,000 cusecs one day, were two days afterwards only discharging a trickle hardly worth considering; this is, however, what under the existing conditions actually happens as all the normal flow is taken up and diverted to purposes of irrigation.

46. Again, the Cauvery irrigates in Mysore by direct flow some 108,000 acres and in Madras above the Upper Anicut 94,000 acres, while (neglecting small works) the irrigated area on its tributaries in Madras totals 102,000 acres.

The gross total is over 300,000 acres above the Upper Anicut without considering isolated works. Is it surprising that the fluctuations of water-level at this place are very great and the "diagrams of gauge-readings are far more serrated than those of almost any other large river in India"? *vide* Sir John Benton's Note of 12th May 1911, paragraph 11. It is, moreover, to be realized that, were it not for the power of regulation of level given by the Upper Anicut, the diagram of gauge-readings would be still more serrated than it is.

Although the information required to actually compute the daily inflow into the Cauvery below Sivasamudram is not available, the foregoing remarks explain the reason for what under natural conditions would be the extraordinary results which are shown by the corresponding gaugings at Sivasamudram and the Upper Anicut when considered together. From what has been stated it will be clear why, while in months of abundant supply the half-monthly flow at Sivasamudram is materially less than that at the Upper Anicut—that is, the inflow from the tributaries is considerably greater than the draw-off and losses by percolation, etc.,—in other months (the months of scarcity of rain in the catchment of the river)

precisely the reverse is the case. In average months the results show a mean between the two.

47. *The bad years decide the irrigating capacity of a system.*—In the good years the tributaries have normally water to spare. In the bad years they take almost all the flow, except that of an occasional flood, for irrigation of their own systems. It is not to the good years or even the normal years that any Engineer looks in considering the capacity of a river for irrigation, or indeed its capacity for any purpose.

It is to the supply available in bad years to which he looks, and it is the conditions of the bad years and not the good years which are now presented for consideration. Moreover, it is not the total flow of a bad year which is the ruling factor for consideration in the case of the Madras systems, but the distribution of flow over much shorter periods. A good total discharge for a period of eight months constituting an irrigation season will not save a crop which has been totally deprived of water for fifteen days.

The total supply of a bad year is a very important factor in considering the capacity and duty of an irrigation reservoir, but it is the distribution of supply from half-month to half-month which must be considered when one is concerned with the interests and prosperity of irrigation dependent on direct flow as is the case of the Madras irrigation under the Cauvery.

48. *Analysis of the diagram of half-monthly discharges.*—Leaving out the abnormal year 1901, it will be seen from the diagram that there are recorded losses in transmission between Sivasamudram and the Upper Anicut in the eight years considered as noted below in fractional form, the numerator of each figure being the year and denominator the percentage of net loss in transmission recorded in the half-month :—

In June	1st half	$\frac{04}{5}$.							
	2nd do	$\frac{02}{20}$,	$\frac{05}{45}$,	$\frac{06}{44}$,	$\frac{07}{23}$,	$\frac{08}{40}$.			
In July	1st do	$\frac{02}{35}$,	$\frac{03}{36}$,	$\frac{04}{24}$,	$\frac{05}{4}$,	$\frac{06}{43}$,	$\frac{07}{5}$,	$\frac{08}{18}$,	$\frac{09}{6}$.
	2nd do	$\frac{02}{18}$,	$\frac{03}{5}$,	$\frac{05}{26}$,	$\frac{06}{37}$,	$\frac{07}{37}$,	$\frac{08}{15}$,	$\frac{09}{1}$.	
In August	1st do	$\frac{03}{5}$,	$\frac{04}{24}$,	$\frac{05}{10}$,	$\frac{07}{36}$.				
	2nd do	$\frac{02}{22}$,	$\frac{04}{20}$,	$\frac{05}{44}$.					
In September	1st do	$\frac{02}{8}$,	$\frac{04}{64}$,	$\frac{05}{24}$,	$\frac{08}{5}$.				
	2nd do	$\frac{04}{38}$,	$\frac{05}{11}$,	$\frac{06}{16}$,	$\frac{07}{28}$,	$\frac{08}{16}$.			

49. *Great liability to loss in the south-west monsoon.*— From the above it will be clear that the liability to loss in transmission during the south-west monsoon is great and that it is just in the worst years 1904, 1905 and 1908 that the loss is certain and greatest and most continuous. The character of the rainfall, on which depends the whole difference between considerable losses and gains in transmission, is very uncertain and variable in the south-west monsoon, and it is only from the catchments in the hills of the Western Ghauts, Coorg, Malabar and the Wynaad to which one can confidently look for an assured supply. In bad half-months, the run-off from these catchments dwindles and becomes smaller as the flow from them passes down the river. In good half-months in which the rainfall in the plains has been abundant the reverse is the case.

The diagram, however, clearly shows that the risk of loss in transmission is great, real and always present in the south-west monsoon, and it is contended that a substantial allowance for this must be made.

Mysore has, in correspondence, put forward a suggestion that, in the event of water being measured in Mysore, allowance should be made for "gain in transmission," and quotes Sir John Benton's Note of 28th July 1911 in support of this.

What Sir John Benton said was that allowance might be made for "net gain" in transmission. This is shown in the diagram prepared from the statements of half-monthly discharges drawn up by the Chief Engineer, Mysore, to be frequently a "minus figure."

Madras has an absolute right to be safeguarded against losses in all cases, and the only way to do this is always to make allowance of a safe percentage of additional water to cover such loss during the season of the year (the south-west monsoon) in which it is shown that the loss is liable to occur and cannot be foreseen.

50. *North-east monsoon loss in transmission infrequent.*—In the north-east monsoon it will be seen that, while loss in transmission is by no means absent, it is infrequent except when the total discharges are so small as to be indubitably all due to Madras. The diagram shows one exception in October 1904 when there was a large loss in transmission although the flow of the river was considerable.

51. *Madras claims allowance for loss in transmission in the south-west monsoon.*—For the reasons stated above, Madras claims allowance for loss in transmission during the south-west monsoon but considers that the occurrence of loss in transmission during the north-east monsoon is too infrequent to justify a claim to cover the risk in that season.

52. *Percentage to be allowed for loss in transmission.*—When the question of the amount of allowance which must be made for loss in transmission is considered, the matter must be admitted to be one not capable of exact computation.

The records of discharge available are admitted to be too great for high floods, and these could not on this ground be taken account of in computing centages. Fortunately they are not required, for the conditions of river-flow will become so altered, if the Mysore Reservoir is made, that the highest discharges passed down during the impounding period will be generally limited to a maximum stage of about 3,000 million cubic feet in 24 hours. In considering losses in transmission, therefore, it is best only to consider discharges within a limit of about between 1,500 and 3,000 million cubic feet.

Below 3,000 million cubic feet discharge observations are not likely to be very inaccurate and while not finally accepted are the best available, while the centage losses between 1,500 and 3,000 million cubic feet stages of the river will fairly represent those likely to be realized if the Mysore Reservoir were constructed. As the river stage of flow increases the inaccuracy of computed discharges also increases, and it is therefore desirable to limit as above the maximum flow stage considered. It has also to be considered that losses by evaporation and absorption are likely to be greater for very low discharges, and it is therefore not desirable to take very low discharges into consideration.

The figures made use of are open to question as to accuracy but are the best available, and as such they form the best basis for argument and indeed they are the only ones from which definite quantities can be stated.

53. With a view, therefore, to getting a fair idea of the losses in transmission actually recorded with the river in stages of discharge which reproduce most nearly the stages during which the losses in transmission are required to be known, a table has been made of losses recorded in the continuous periods in which the river was actually flowing in such stages. The dates of discharges at Sivasamudram and of the corresponding discharges at the Upper Anicut and the figures of daily discharges are given in Appendix XI.

54. *Table showing losses actually recorded.*—The table of totals and centage of loss in transmission is as follows :—

15

TABLE showing discharges of the Cauvery at Sivasamudram compared with those at the Upper Anicut.

Months	1901				1902				1903			
	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage
1	2	3	4	5	6	7	8	9	10	11	12	13
		M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.	
June	...	...	...	...	15-18	8,412	4,666	55·5	...	...	...	...
July	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	..	...
August	...	...	...	...	...	...	...	...	25-29	10,702	9,260	86·5
	...	...	...	...	...	...	...	...	...	...	...	...
September	...	...	...	...	4-6	7,494	5,556	74·1	1-2	4,674	3,875	82·9
	...	...	...	...	15-21	14,180	13,281	93·7	...	...	...	...

Months	1904				1905				1906			
	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut.	Percentage
	14	15	16	17	18	19	20	21	22	23	24	25
		M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.	
June	...	...	...	...	22-24	5,709	3,956	69·3	24-26	5,703	2,745	48·1
July	16-22	20,073	18,249	90·9	13-14	3,758	2,865	76·2	...	...	...	...
	26-31	13,561	10,780	79·5	...	...	...	...	...	...	...	...
August	1-4	8,306	5,896	71·0	2-8	13,669	9,941	72·6	...	...	...	...
	16-26	23,654	14,563	61·6	23-31	17,110	12,301	71·8	...	...	...	...
September	14-19	13,667	7,746	56·7	1-4	7,519	5,531	73·5	14-16	4,935	3,610	73·0
	23-25	5,561	3,206	57·6	3-14	15,258	11,593	76·0	...	...	...	...

Months	1907				1908				1909			
	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage	Period	Discharge at Sivasamudram	Discharge at the Upper Anicut	Percentage
	26	27	28	29	30	31	32	33	34	35	36	37
		M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.			M.C.FT.	M.C.FT.	
June	18-23	11,873	9,292	78·3	...	...	...	...	...	...	...	...
July	...	...	...	...	8-16	18,795	15,612	83·1	2-6	10,596	10,170	96·0
	...	...	...	...	...	...	...	...	...	...	...	...
August	...	...	...	...	13-27	29,177	25,370	87·0	13-16	7,160	6,232	87·0
	...	...	...	...	...	...	...	...	...	...	...	...
September	23-24	3,070	2,360	76·8	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...

55. *Allowance for loss in transmission considered reasonable.*—This table shows loss in transmission varying from a maximum of 51·9 *per cent.* The general view, however, taken from consideration of the figures is that an allowance of 25 *per cent.*

would secure Madras on all but rare occasions from losses in transmission. This figure is therefore put forward as a reasonable and the lowest safe allowance to be made for loss in transmission from all causes between Sivasamudram and the Upper Anicut. This includes inflow and draw-off for irrigation and is not necessarily a suitable figure to represent losses on account of evaporation and percolation excluding the above.

The general consideration as regards losses elsewhere do not show that this figure is an unlikely one and, while admittedly based on imperfect data, it is also based on the best data available and is advanced with confidence as a reasonable tentative figure.

56. *Losses shown by velocity observations of 1913.*—The record of the velocity and discharge calculations taken in September of the current year tend to show that the Mysore discharges at Sivasamudram for the stages gauged are overstated. The same gaugings also show a material loss in transmission throughout the period between Danakere, seven miles above Sivasamudram, and the Upper Anicut.

The statement (Appendix X) shows these losses, assuming the gaugings as being accurate, to amount to over 20 *per cent.* in one week and for the whole period of three weeks taken together to 14·41 *per cent.* and a loss in transmission occurred in every single day of the period except one. It is submitted that the liability to material loss between Sivasamudram and the Upper Anicut in the south-west monsoon is fully proved and the allowance of 25 *per cent.* is put forward for tentative acceptance.

The above is the figure which includes allowances for inflow and draw-off between Sivasamudram and the Upper Anicut, but not for "draw-off" above Sivasamudram.

57. *Loss in transmission excluding "inflow and "draw-off."*—It is further required to consider what the percentage of losses in transmission will be excluding "inflow" and "draw-off", that is, losses due to evaporation, absorption and percolation only. This figure may differ materially from the one previously the subject of enquiry. In this latter case, it will be clear that there must always be some loss in transmission. In the former case, there could be, and is, as a fact, a gain on the many occasions when a large inflow was realized. The case under consideration is quite different, for loss is the invariable condition, and it remains to examine how much this loss may be fairly assessed at. It is necessary to assess the loss as it is a necessary item in working under a reasonable and logical basis the system of regulation proposed by Mysore. Unless the loss in transmission by evaporation and absorption is allowed for, the compensation water to be issued to Madras cannot be correctly computed.

For instance, if the flow at the Upper Anicut on any day was less than the Madras allowance for that day by "A" million cubic feet, the amount to be issued by Mysore as compensation would not be A but $\left\{\frac{100}{100-t} \times A\right\}$ where t = the loss *per cent.* on the compensation water issued from Kannambadi. It is thus necessary to fix a value for t.

58. It may be noted that for the Madras Cauvery Project the allowance for "t" for a distance of transmission less than half that now considered varies from a maximum of 50 to a minimum of 20 *per cent.*—*vide* paragraph 30 above. The conditions in the case were precisely similar to those under consideration now.

While this is no proof of the true value of "t" applicable to the Madras Project, it clearly shows what figures were considered reasonable by Madras officers, who were most anxious to get their project through with the lowest figures they could safely adopt.

59. *Statement of actual measurements of loss in transmission.*—The only approach to actual measurement of the loss in transmission, excluding "inflow" and "draw-off", which is available, is furnished by the statistics of the computed flow of the Cauvery at Sivasamudram and at the Bhavani bridge. The draw-off for irrigation between these points is only for 128 acres. The inflow in periods of small rainfall may be neglected for discharges within the limits of consideration, *viz.*, above 12,000 cusecs, say above 1,000 million cubic feet per day and below about 3,000 million cubic feet per day. Within these limits of flow a statement has been prepared showing losses actually recorded from the discharges at Sivasamudram and the Bhavani bridge.

The statement is similar to that prepared for losses between Sivasamudram and the Upper Anicut.

Table showing percentage of discharges of the Cauvery at the Bhavani Bridge compared with that at Sivasamudram.

Months	1901				1902				1903			
	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage
1	2	3	4	5	6	7	8	9	10	11	12	13
		M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.	
June	...	...	...	...	16-19	7,755	6,021	77·64	...	...	...	...
July	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
August	4- 8	10,123	8,055	79·57	23-30	9,354	7,783	83·20	8-12	12,833	10,598	82·57
	10-16	13,859	10,845	78·25	...	...	...	...	14-21	16,533	12,529	75·78
	18-30	20,746	15,538	74·90	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	8-11	5,991	5,673	94·69
	...	...	...	...	17-25	14,247	13,428	94·25	14-23	18,007	16,620	92·30

Months	1904				1905				1906			
	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage
	14	15	16	17	18	19	20	21	22	23	24	25
		M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.	
June	...	...	...	...	...	...	...	...	...	...	...	...
July	16-22	20,073	15,362	76·53	5- 8	6,021	5,305	88·10	...	...	...	...
	...	...	...	...	13-15	5,193	4,705	90·60	...	...	...	...
	...	...	...	...	18-20	3,992	2,892	72·11	...	...	...	...
August	...	...	...	...	...	...	...	...	...	...	...	...
	16-31	30,116	22,441	74·51	2-31	49,597	36,742	74·08	5- 8	6,598	5,772	87·48
	...	...	...	...	...	...	...	...	...	...	...	...
September	1-2	2,294	1,330	58·00	1-20	33,955	26,384	77·70	12-24	19,588	15,505	79·15
	12-27	28,277	22,378	79·13	..	...	...	...	...	...	...	...

Months	1907				1908				1909			
	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage	Period	Discharge at Sivasamudram	Discharge at the Bhavani bridge	Percentage
	26	27	28	29	30	31	32	33	34	35	36	37
		M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.			M.C. FT.	M.C. FT.	
June	18-25	14,161	7,615	53·76	21-23	4,121	2,249	54·57	...	...	...	...
July	6-11	8,978	7,174	79·91	8-16	18,795	15,584	82·92	2-10	19,961	17,683	88·58
	...	...	...	...	...	...	...	...	22-25	9,736	8,552	87·84
	...	...	...	...	...	...	...	...	...	...	...	...
August	...	...	...	..	...	...	...	...	...	..	..	...
	...	...	...	...	13-31	34,783	27,501	79·06	7-26	38,905	35,457	91·14
	...	..	...	...	...	...	...	...	...	...	...	...
September	13-21	14,839	10,925	73·63	1-10	11,847	11,457	77·17	16-20	5,879	5,092	86·61
	...	...	...	...	...	...	...	...	25-28	4,606	3,249	70·54

60. *Results deduced from statement of losses.*—The statement shows losses in transmission between Sivasamudram and the Bhavani bridge (a distance of 114 miles) as varying from a maximum of 46 *per cent.* (in June). The two greatest centage losses are in the month of June when the river needs filling up, and the figures do not differ very greatly from the 50 *per cent.* allowed for such losses in June in the Madras Cauvery Project.

A fair computation of the allowances for loss, not taking an extreme view of the results, appears to be about 25 *per cent.* The distance between Kannambadi and the Upper Anicut is 257 miles, about double the distance between Sivasamudram and Bhavani. These figures would give a loss of 50 *percent.*, for the whole distance. That is, if there were no inflow or draw-off, only half the water passing Kannambadi would be delivered at the Upper Anicut. There is, however, a consideration which modifies this in some respect, *viz.*, that the loss on additional water to flow already in existence will be less than that of the whole flow.

Although actual figures are not available to show this, there can be little doubt that, if a loss in transmission for 20,000 cusecs is 50 *per cent.*, the loss for 40,000 is likely to be materially less and still less for 60,000 and so on.

If it were 40 *per cent.* for 30,000, then the less due to the added 10,000 would be only 20 *per cent.* The 50 *per cent.* loss on the whole flow for the 257 miles from the reservoir to the Upper Anicut is based on the best figures available. The reduction to be made on the compensation water to be added by Mysore cannot be measured, but, on the consideration stated above, it is thought that half the gross loss, which in this case would be 25 *per cent.*, would be a reasonable figure for stages of river flow between 1,000 million cubic feet and 3,000 million cubic feet per day, and this figure of 25 *per cent.* is considered and put forward as a suitable and reasonable allowance to be made for loss in transmission.

61. *Centage allowance proposed for loss in transmission on compensation water.*—The figure compares favourably as regards Mysore interests with those allowed for the Madras Cauvery Project, which varied from 20 to 50 *per cent.* for transmission over about half the distance.

Attention is also here drawn to the allowance for loss made by the late Chief Engineer, Mysore, Mr. McHutchin, an officer who served the greater part of his life in the Province. In writing about the capacity required in Kannambadi Reservoir for passing down water for power in the hot season he says "now in the worst year we have ever experienced, 1906, I calculate (allowing 60 *per cent.* for loss of water in passing it down from the dam to Sivasamudram) we would require 20,000 units. . . . ." It will be seen that this officer considered it necessary to allow 60 *per cent.* for losses by evaporation and absorption in a distance of 60 miles in the hot season for the small flow required for power.

62. *Losses shown by velocity observations of* 1913.—In relation to the value of "*t*", it is in this case also desirable to bring to notice the recorded losses in September of this year on the gaugings at Danakere and the flow at the Bhavani bridge. There is draw-off for only 128 acres of irrigation between these two places. Inflow has not been measured but is certainly more than would irrigate 128 acres. It is quite sure, therefore, that the figures (so far as accepted) cannot show a greater loss than that actually due to absorption and evaporation on any day, or series of days, while they may, through the neglect of inflow, show losses less than actually occur. It will be seen that, on the actual records of discharge for one week, a loss of 19 *per cent.* has occurred, while for 21 consecutive days the actual loss recorded was 15·21 *per cent.* in a distance of 120 miles, actual loss in transmission being recorded on each day of the period except one.

The figures are recorded in Appendix X.

63. *The Madras Government's original figure for losses in transmission including "inflow" and "draw-off."*—In reply to the original application made in October 1910 by Mysore for assent to the construction of their project, the Madras Government asked for further particulars, working rules and tables, and furnished the Mysore Government with full particulars of the assumptions and data on which the Government of Madras had examined the Mysore proposals.

In forwarding their proposals the Mysore Government had not only given no working rules or detail as to what restrictions on impounding they suggested in

order to preserve the prescriptive rights of Madras, but had furnished no statement of discharges of the Cauvery in Mysore. They, however, urged that the very earliest possible reply should be given them as the negotiations in progress between Mysore and the mining companies had, it was stated, reached a critical stage, and unless definite assurance of commencing building could be given at a very early date, the companies proposed to put in steam or oil plant to furnish the extra power required. Under these circumstances, the Government of Madras gave instructions to examine the Mysore scheme on the basis of whatever data might be available, and see if it was feasible and promising under the necessary restrictions for the protection of Madras.

One of the questions which had to be considered was what allowances, if any, were necessary for loss in transmission, including "draw-off" for existing Madras irrigation above the Upper Anicut. To make any well-based estimate of this, a statement of the daily discharges of the Cauvery in Mysore was necessary. No such statement was, however, available. The best information available with Madras was the daily discharges of the Cauvery at the Bhavani bridge. These discharges were therefore worked with as representing the discharges of the Cauvery in Mysore at Sivasamudram. That is, the assumption was made that the inflow balanced the losses between Sivasamudram and the Bhavani bridge.

When the statement of daily discharges at Sivasamudram subsequently furnished by Mysore was compared with the corresponding discharges at the Bhavani bridge, it was clear that the assumption was altogether wide of the facts, and that very considerable losses in transmission between Sivasamudram and Bhavani were frequently experienced in the south-west monsoon, in every month from June to September. On the other hand, during the north-east monsoon, the losses only occurred in years of very deficient flow. Under the original assumption, the comparison of flow between Bhavani and the Upper Anicut showed that losses in transmission were liable to occur in the period from 1st August to 15th November, and to provide for this an extra 10 *per cent.* on the limit flow claimed at the Upper Anicut was included in the Madras computations to provide for loss in transmission.

When this Arbitration was agreed on, the basis of the claims for losses in transmission was the comparison of discharges at Sivasamudram with those realized at the Upper Anicut. It was found at once that both as regards period and percentage the original allowances were wrong, and that the liability to losses was during the months of June to September, and not as deduced from the erroneous assumptions previously made, while 10 *per cent.* was a quite inadequate allowance to cover the liabilities to loss computed on the recorded discharges. The above clearly shows the reason for altering the claim on account of losses in transmission and also shows that the erroneous basis of the original claim was due to default by Mysore to furnish necessary information in the first instance.

64. *Time of transmission of water between Kannambadi and the Upper Anicut.*—

The distances in miles involved are shown in the table below:—

From	To		
	Sivasamudram	Bhavani Bridge	Upper Anicut
Kannambadi	60	174	257
Sivasamudram Anicut	...	114	197
Bhavani Bridge	...	...	83

It is required to consider what will be a reasonable allowance for "*d*" the number of days time occupied in transmission between Kannambadi and the Upper Anicut, under the condition of flow which would obtain while the Mysore Reservoir is under regulation.

65. *Variations of velocity of flow according to stage.*—The velocity of flow of water varies, other things being equal, as the square root of the hydraulic mean depth.

In the case of a wide river, the bed of which is wholly covered with flowing water from margin to margin, the velocity would vary almost as the square root of mean depth. The velocity of flow thus varies with the stage of flow and is a constantly varying quantity. In the arguments advanced below it is taken that the

stage of flow which has to be considered in placing a value upon "*d*" is a stage between 1,500 and 2,500 million cubic feet in 24 hours—say, the stage of flow is about 25,000 cusecs.

In the Madras Cauvery Project it was assumed, for purposes of computation, that the flow at the Upper Anicut synchronized with the flow at the Bhavani bridge two days earlier. An examination of the tables of daily flow at the Upper Anicut and the flow two days earlier at the Bhavani bridge, which are given for twenty years in the Madras Cauvery Project, Volume III, serve to show that this assumption is generally correct for the lower stages of flow, but is too slow a velocity for stages above about 15,000 cusecs. The following tables give the actual mean velocities of flow of the Cauvery as gauged in 1909 at a place about three miles above the the Bhavani bridge and also just below the Cauvery Dam:—

Table of mean velocities three miles above the Bhavani bridge.

Stage of flow		Mean velocity feet per second $= \frac{\text{Discharge}}{\text{Area of section}}$	Number of days and hours to reach the Upper Anicut at this rate of flow	
Discharges	Equivalent million cubic feet per day			
CUSECS.			DAYS.	HOURS.
15,000	1,296	3·1	1	15
20,000	1,728	3·4	1	12
25,000	2,160	3·7	1	9
30,000	2,592	3·9	1	7
40,000	3,456	4·4	1	4
60,000	5,184	5·2	...	23
80,000	6,912	5·7	...	21
100,000	8,640	6·3	...	19
125,000	10,800	7·0	...	17

Table of mean velocities gauged below the Cauvery Dam.

Stage of flow		Mean velocity feet per second $= \frac{\text{Discharge}}{\text{Area of section}}$	Number of days and hours from Bhavani at this rate	
Discharges	Equivalent million cubic feet per day			
CUSECS.			DAYS.	HOURS.
15,000	1,296	2·7	1	21
20,000	1,728	2·9	1	18
25,000	2,160	3·2	1	14
30,000	2,592	3·4	1	12
35,000	3,024	3·7	1	9
40,000	3,456	3·8	1	8

66. *General character of the Cauvery between Bhavani and the Upper Anicut.*—The general conditions of the river do not vary very greatly between Bhavani and the Upper Anicut. For the first 12 miles the bed is rocky with shallow sand overlying the rock. Below Erode the rocks gradually disappear, the sand gets deeper and the bed wider, and from the Noyel confluence down to the Upper Anicut the width of the river between margins is from 50 *per cent.* to 100 *per cent.* greater than above the Bhavani bridge. The general character of the river and the velocities of flow do not alter greatly, but the tendency is for the velocity to decrease as one goes further down. The river has not been gauged between these places.

67. *Representative velocity below Bhavani.*—If the mean of the velocities of the two stations representing a stage of 25,000 cusecs is taken, the result is a velocity $\frac{3·7 + 3·2}{2} = 3·45$. This connotes a time of transmission of 35¼ hours, say, 1½ days, and this figure is taken as a fair allowance of the time of transmission in the stage of flow under consideration bewteen the Bhavani bridge and the Upper Anicut.

68. *Length of the river between Sivasamudram and Bhavani.*—Again, consider the length of the river between the Bhavani bridge and Sivasamudram. The distance is 114 miles. As regards the character of river flow for the whole length, it is not well known. There are some rapids in which no doubt the river attains a high velocity.

For 30 miles above Bhavani the character of the river is known. For some 6 or 8 miles it is similar to that at Bhavani. Above this the river narrows somewhat

and the current becomes more rapid. The river, however, is free from rapids and for 30 to 40 miles above Bhavani up as far as Hogankal falls is largely used for carriage by water in basket boats of green manure from the forests of North Salem and Coimbatore.

The following table gives mean velocities and corresponding days and hours required to transmit water from Sivasamudram to the Bhavani bridge (114 miles):—

Velocity.	Days and hours of transmission	
	Days.	Hours.
2 feet per second	3	12
3 ,, ...	2	8
4 ,, ...	1	18
5 ,, ...	1	9
6 ,, ...	1	4
7 ,, ...	1	...
8 ,, ...	...	21
9 ,, ...	...	18
10 ,, ...	...	17

69. *River between Kannambadi and Sivasamudram.*—Again, in the length of the river between Sivasamudram and Kannambadi, the character of the river alters and the rate of flow is materially slower.

From about a mile above the Sivasamudram Anicut for several miles above the Danakere Anicut the flow in the stage about 2,500 million cubic feet per day is slower than the flow of the Cauvery between Bhavani and the Upper Anicut.

The actual velocity observations taken below the Danakere anicut show for the same stages of flow very materially smaller mean velocities than those above the Bhavani Bridge. Allowing, however, for this length of 60 miles the same mean velocity as that gauged at Bhavani for a stage of 25,000 cusecs, *viz.*, 3·7 feet per second, the time of transmission works out to 24 hours for 60 miles.

70. *Computation of time of transmission.*—Allowing a mean velocity for the Sivasamudram to Bhavani length of river of 7 feet per second, which is probably excessive, the total time of transmission works out—

From Sivasamudram to the Upper Anicut—2 days 12 hours.

From Kannambadi to the Upper Anicut—3 days 12 hours.

The Government of Madras (in paragraph 19, Exhibit Ma. 3) have suggested 3½ days as a reasonable estimate of the allowance to be made for time of transmission, and the above arguments are adduced in support of this estimate.

71. Reference to daily record of discharges and comparison of the gauge-readings and days giving the peaks of floods generally support the above arguments (*vide* Appendix XIV). The discharges show that the maximum limit of a fresh, that is, the peak of the flow, is generally one day later at Bhavani than at Sivasamudram, while between Bhavani and the Upper Anicut the interval is sometimes one day and sometimes two days. The gauge-readings recorded are all taken in the morning. Considerable floods, say, over 5,000 million cubic feet per day, traverse the distance between Sivasamudram and the Upper Anicut in two days. It is a matter of certainty that the lower flow will require considerably more time to traverse the distance, and the estimate of 2½ days is probably below the mark. The matter is one which does not admit of really accurate solution, for a value of "*d*" which is accurate for one particular stage of flow must be inaccurate for any other.

Mysore Rules of Regulation.

72. *Actual rules of regulation proposed by Mysore.*—The Madras Government take objection to the principles of regulation formulated in the rules proposed by Mysore (Exhibit My. 2) on grounds already generally stated, *viz.*—

(*a*) These rules do not provide for delivering the quantities of water to which Madras has rights.

(*b*) The incidence of flow is altered in a manner unfavourable to Madras irrigation and in a way which infringes prescriptive rights.

(*c*) The system is complex and would prove unworkable in practice.

The matter of limit quantities has already been dealt with and the inadequacy of the limits proposed by Mysore exposed. It is, however, necessary to adopt a limit in giving examples of the actual working of the Mysore system and two examples are therefore given :—

System "M."—The Mysore system with a limit representing the claim of Madras, *viz.*, 2,944 million cubic feet, at the Upper Anicut (Appendix XIII).

System "N."—The Mysore system with the limit quantities, 2,300 million cubic feet at the Upper Anicut.

Reference to these tables is requested as a proof of the allegations of Madras regarding the defects of the principles of regulation proposed by Mysore.

One alteration has been made in applying Mysore rules in taking the time of transmission from Kannambadi to the Upper Anicut as three instead of two days. It is not open to serious dispute that three days is too short a time. The Madras contention is that 3½ days is a low estimate of time of transmission, but gauge-readings and discharges at 3½ days' interval are not readily available and for purpose of illustration three days is taken.

The tables are somewhat complicated, and in order to avoid further complication the consideration of the percentage "*t*" due on compensation water to cover loss by evaporation and absorption has not been included in the computations, and for simplicity further reference to it is omitted in the following remarks regarding the system.

The Mysore system of regulation involves the impounding daily at Kannambadi of the natural flow reaching the reservoir, that is, the inflow, and also involves the issue daily from the reservoir either of the deficit at the Upper Anicut of the flow of that day from the amount of the limit flow to which Madras is entitled or the whole inflow at the Kannambadi Reservoir three days previously, whichever quantity is least.

73. *Remarks on results of practical application of Mysore Rules.*—During a period of steady or slowly fluctuating flow both at impounding station and receiving station, the incidence of flow and the total useful deliveries are not subjected to grave alterations, but in a period of fluctuating flow at either station the reverse is the case, and the fluctuating flow is made to fluctuate to a still greater degree. Further, not infrequently, water which is issued to compensate Madras for withdrawals three days previously, has to be surplused when received, and in no way compensates for the natural flow impounded by Mysore to the deprivation of Madras. It is obvious that to withdraw a quantity Q from a total natural flow $2Q$ and to give it back three days later when the natural flow is $3Q$, thus raising the flow to $4Q$, does not make up for the previous deprivation even if the conditions are not such as to necessitate surplusing some of the $4Q$.

To take half the natural flow from lands when this flow amounts to half supply, and to give it back three days later when the natural flow is three-fourths the full supply, does not make up in full the loss sustained from the first deprivation, although the total quantity of water delivered to the fields may be the same. The defect of making the naturally irregular incidence of flow still more irregular is inherent in the Mysore system of regulation, and on this ground alone the Government of Madras strongly oppose such a system as an infringement of their rights.

The rights of Madras not only extend to a total limit of natural flow, but to a natural incidence of flow, and whatever interferes in such a way as to make such incidence more unfavourable is an infringement of the prescriptive rights of Madras.

74. *Working Tables and Diagrams, Mysore Regulation System.*—The tables and diagrams prepared to show the working of the Mysore system (excluding loss by absorption and evaporation) have been prepared for the period from June to October 1905, and these exhibit the inherent defects of the system (*vide* Table, Appendix XIII, and diagrams M and N).

75. Actual quantities appear in the tables and in the remarks column the quantities of compensation water which has to be surplused are shown. As this water is passed by Mysore as repayment for their excessive impounding, the surplusing of this involves deprivation to Madras of water to which they have prescriptive rights.

The diagrams perhaps represent the matter more clearly. The increasingly serrated character of the water level is very marked.

The quantity of compensation water lost by surplus on any day is shown cross-hatched. Horizontal hatching shows decrease of supplies on any day and cross-hatching increase due to the application of the system of regulation under discussion. When the horizontal hatching goes below the zero line or where the tables indicate a *minus flow*, this means that the flow feeding the Madras irrigation above the Upper Anicut has been deprived of water to this extent.

It will be seen that, quite irrespective of the actual quantities proposed, the system of regulation proposed by Mysore has very grave inherent defects, and the Government of Madras most strongly object to a system worked on these principles which will certainly not "ensure to Madras full protection of their prescriptive rights."

Madras Rules of Regulation.

76. *The Madras system of regulation.*—The principle on which the Madras proposals for regulation are based is the actual measurement of flow in Mysore and entails on Mysore the duty of refraining from impounding unless and until water is passing in Mysore in sufficient quantity to cover the Madras limit flow after adding allowances for losses in transmission. Provided the above allowances are adequate, such a system absolutely secures to Madras without failure the flow to which it is decided there is prescriptive right, both as regards quantity and incidence of flow, and it is submitted it is the only system which can absolutely safeguard the rights of Madras, while at the same time permitting impounding by Mysore to the fullest extent compatible with such a safeguard.

77. *Allowance to be made for irrigation above Sivasamudram.*—From the figures of discharges at Sivasamudram and the Upper Anicut, Madras has advanced a claim to 25 *per cent.* addition to the limit flow on account of liability to losses between these two places. There is, however, between Sivasamudram and the places of measurement of flow a large area of irrigation fed by "direct flow" from these four rivers measured. This draw-off is not, like that of the channels below Sivasamudram, included in the 25 per cent, and a specific allowance must be made for this.

As a fact the grater part of this irrigation will be fed through the main sluices of the Kannambadi Dam through which the water for Madras will also be passed. What is required to pass through the sluices at Kannambadi is a sufficient supply to feed the Mysore irrigation between the places of measurement and Sivasamudram in addition to the allowance decreed as due to Madras.

The areas of irrigation, for which allowances must be made, cannot be absolutely fixed until the places of measurement of the discharges are fixed. Roughly the areas are outlined below:—

	ACS.
The Cauvery and tributaries—all irrigation between places of measurement and reservoir	23,000
Mysore Cauvery irrigation between Dam and Sivasamudram ...	40,000
Madras Cauvery irrigation between Dam and Sivasamudram ...	760
Mysore irrigation below place of measurement on the Kabbani ...	12,000
Total ...	75,760
or say	76,000

In Madras the usual duty allowance for minor channels taking off direct from the Cauvery is 30 acres per cusec. The same allowance is usual in Mysore (*vide* Report and Notes, Cauvery Reservoir Project, Mysore, Part II, page 10). It is however, considered that the undernoted allowances will, subject to suitable restrictions, suffice, *viz.*,—

At a duty of 40 acres per cusec for the months of June to August and 60 acres per cusec for the months of October to December, the daily extra requirement is—

	M.C.FT.
June to September	162
October to December	110

No claim is made for losses in transmission between the places of measurement and Sivasamudram, these losses being set off against the run-off from the catchments.

If L be the limit amount of flow due to Madras as fixed under the second term of reference, the claim by Madras is that no impounding shall be allowable in the Mysore Reservoir unless the total flow to the reservoir as measured on the Cauvery, the Hemavathi and the Lakshmanatirtha *plus* the flow of the Kabbani exceeds a stage of flow noted below and the amount of impounding shall be limited to such excess.

For the months June to September inclusive—

$$\left\{\left(L \times \frac{100}{100-25}\right)+162\right\}$$

that is $\left(\frac{4}{3}\,L + 162\right)$

For October to December inclusive—

$$(L+110).$$

For January and February L.

On conditions stated below, a concession as regards impounding in February is made which allows Mysore to impound in February the amount of water *issued to power from the reservoir on any day* or the actual inflow of that day, whichever is least.

For the months of March, April and May, the Government of Madras claim that their rights extend to the full natural flow of the river up to a limit flow of L million cubic feet per day.

The Government are, however, prepared to waive these rights and to permit impounding in the Mysore Reservoir of the whole natural flow during these months on condition of the Mysore Durbar undertaking to pass to Madras through the left branch of the river at Sivasamudram a continuous flow of not less than 900 cusecs throughout the period February to May inclusive and producing proof in the form of rules of regulation and working tables that they will be able to give effect to this undertaking. It is only on this condition that the Madras Government consent to waive their prescriptive right to the full natural flow of the river in the months of February, March, April and May.

78. *Tentative character of award of the Arbitration Committee.*—The Madras Government have strongly pressed for a clear and final pronouncement regarding the matters under arbitration, while " the Mysore Government also earnestly hope that the decision of the Arbitration Committee may, as far as practicable, have the vital element of finality." (Exhibit My. 4, paragraph 35.) On this matter, therefore, both parties are in agreement. In view of the unreliability of the computed discharges of the Cauvery at Sivasamudram, which discharges are necessary for forming a reliable estimate of the percentage of liability to loss or gain in transmission, the Government of Madras must perforce agree that the actual figure of proportion or percentage of flow in Mysore which may form a feature of any system of rules decided on shall be tentative and subject to revision as soon as reliable figures of discharges can be adduced to take the place of the doubtful ones now forming the basis of argument.

The Government of Madras strongly urge that the principles and system on which regulation is to be carried out should now be fixed, and that the only item of a tentative character shall be the actual figures representing percentage or proportion of flow lost in transmission. The principles of regulation and the system and rules are unaffected by whatever figures may be finally fixed for percentage or proportion of allowance for gain or loss, and rules having " the vital element of finality" except in respect to this one point are pressed for. No further flow observations or measurements can give assistance in framing principles upon which to base rules.

79. *Unsatisfactory measurements by Mysore.*—It will be clear that it is only on account of the unreliable character of the statistics of discharges of the Cauvery advanced by Mysore and owing to their extraordinary omission to take the most elementary steps to get verifications of their discharges that the necessity for tentative settlement of these figures arises.

Mysore have claimed to have had this project in view for many years. It is known that in another form it has been under investigation since 1906, and yet that Government come before this Committee with the admission that their discharges at Sivasamudram are quite unreliable and that they have taken no steps to remedy this state of affairs. Had Mysore stated in 1910 or at any time since then that these discharges were unreliable, the Government of Madras would have at once taken steps to rectify this defect.

The steps to be taken were obvious, as also to any one acquainted with the site was the unreliability of the discharges on which Mysore based their data for water available for impounding in their reservoir. Not only did Mysore furnish unreliable discharges, but they informed the Government of Madras throughout the controversy that they were accurate except for very high floods and it was only before this Committee that they repudiated them. The conditions in this case afforded to the Mysore Government quite unusual facilities for computing daily discharges without trouble or material expense.

Just below the dam site at Kannambadi there is an anicut admirably suitable for computing discharge from gauge-readings. Gauge-readings were not taken, and the representation made that the anicut was unsuitable for the purpose will not bear examination.

On the Kabbani and the Lakshmanatirtha there are anicuts where it is possible to take daily gauge-readings from which daily flow could be computed without any great margin of error. Again gauge-readings were not taken.

Seven miles above Sivasamudram there is an anicut much better adapted than the Sivasamudram anicut for the purpose of computing discharges of the main river from gauge-readings. No gauge-readings were taken. Each and all of the places mentioned are far better adapted than the Sivasamudram site for gauging the flow, yet Mysore neglected to take the most obvious and inexpensive observations to get reliable discharges.

80. *Madras should have the benefit of any doubt.*—Under any circumstances, it is claimed by Madras that their right is *to be fully safeguarded.* Under the special circumstances above stated, it is doubly their due that on any doubtful point Madras should be given the benefit of the doubt. In the tentative settlement it is urged that the Government of Madras should be given allowances for loss in transmission as a tentative figure which will fully protect them.

81. *Finality in award as regards system of settlement asked.*—Further, in view of the finality of principle and system which is desired, it is urged that in fixing the tentative figures the principles and system on which these figures are arrived at should be clearly enunciated, so that on the corrected discharges being available, it will be unnecessary to re-open the whole case and all that will be necessary will be to apply the same method to the new figures of discharge available as was used in arriving at the tentative figures.

W. M. ELLIS, COL., R.E.

1

Exhibit Ma. 8-a.

Mysore Cauvery Reservoir Project.

Ordered that a copy of the demi-official letter to the Resident in Mysore suggesting the construction of a small reservoir for power alone or for power accompanied by a limited amount of irrigation be forwarded to the Government of India for information.

G. O. No. 296-I., 18th September 1911, Government of Madras, Public Works Department (Irrigation).

READ the following papers:—

I

G. O. No. 427-I., dated 23rd December 1910.

ABSTRACT.—Ordering that a letter be sent to the Government of India requesting that the estimates of the British Cauvery Reservoir project be recommended for the sanction of the Secretary of State without delay as the question of its settlement is independent of the acceptance or rejection of the Mysore Cauvery Reservoir project.

II

Letter No. 78-I, dated the 8th March 1911, from the Hon'ble Mr. H. E. Clerk, Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch, to the Secretary to the Government of India, Public Works Department.

In continuation of my letter No. 428-I., dated 23rd December 1910, regarding the reservoir on the Cauvery river proposed by the Mysore Durbar, I am directed to inform you that the Dewan of Mysore has now asked to be supplied with a copy of the report of the Cauvery Reservoir project which was forwarded to you with my letter No. 386-I., dated 3rd December 1910.

2. As explained in paragraph 3 of my letter No. 428-I., dated 23rd December 1910, the objections advanced against the reservoir proposed by the Mysore Durbar were based entirely on the injury which would be sustained by existing cultivation, were that work constructed, and tables were furnished showing the quantities of water which would have been available during a series of years and the dates on which they could have been stored without affecting the existing interests of the British ryots. As the arguments of this Government were not based on any consideration of prospective expansion of irrigation, it was not considered necessary to supply the Durbar with the report on the project; but, as the Dewan of Mysore has now asked for a copy, I am directed to state that this Government does not consider that there are sufficient grounds for withholding it, although any arguments which may be deduced from it are irrelevant to the point at issue.

3. Under the instructions conveyed in Mr. Barnes's letter No. 3045-I., dated 16th September 1890, this Government appear to be debarred from furnishing the three volumes of the Cauvery Reservoir Report to the Mysore Durbar without the previous sanction of the Government of India, which I am directed to request may be accorded.

III

Letter No. 463-I, dated Simla, the 11th April 1911, from Mr. H. M. Willmott, Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch.

In reply to your letter No. 78-I., dated the 8th March 1911, I am directed to say that the Government of India have no objection to the Mysore Durbar being supplied with copies of the three volumes of the report on the Cauvery Reservoir project.

2. I am to take this opportunity to request that the Mysore Durbar may, with the permission of the Governor in Council, be asked to give an early reply to the communication referred to in paragraph 3 of your letter No. 428-I., dated the 23rd December 1910, regarding the effect of the Mysore scheme on the existing irrigation in British territory.

IV

Letter No. 759-I, dated Simla, the 15th July 1911, from Mr. H. M. Willmott, Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch.

With reference to the correspondence ending with the letter from this department No. 463-I., dated 11th April 1911, I am directed to forward, for the information of the Government of Madras and for any remarks which that Government may desire to make, a copy of the marginally-noted correspondence regarding the proposal of the Mysore Durbar to construct a reservoir on the Cauvery river within the limits of the Mysore State.

Letter No. 2053-E.I., dated 3rd April 1911, from the Resident in Mysore to the Government of India, Foreign Department, and enclosures.

Letter No. 1315-I.B., dated 27th June 1911, from the Government of India, Foreign Department, to the Resident in Mysore, and enclosure.

ENCLOSURES.

(i)

Letter No. 2053-E. I., dated Bangalore, the 3rd April 1911, from the Hon'ble Lieut. Col. H. Daly, C.S.I., C.I.E., Resident in Mysore, to the Secretary to the Government of India in the Foreign Department.

With reference to the correspondence ending with Foreign Department endorsement No. 1899-I, dated 9th May 1892, on the subject of the restoration and construction of irrigation works in Mysore, I have the honour to forward herewith, for favour of the orders of the Government of India, a copy of a letter No. 869-Pol., dated the 27th March 1911, from the Mysore Durbar, regarding the proposed construction of a reservoir on the Cauvery within the limits of the Mysore State.

Internal B., May 1892, Nos. 288-93.

2. As the Durbar's claim appears to be worthy of consideration, I would suggest the desirability of appointing a suitable officer to report on the matter with the concurrence of the Madras Government.

I may add that the matter is one of great urgency not only from the point of view of the Mysore Durbar but also of the Kolar Gold Field Mining Companies who are in great need of extra power to drive their engines during the hot weather.

SUB-ENCLOSURES.

Letter No. 869-Pol., dated the 27th March 1911, from the Dewan of Mysore, to the Honourable the Resident in Mysore, Bangalore.

I have the honour to request the favour of your addressing an urgent communication to the Government of India with a view to obtaining their permission to the commencement of construction work on the proposed Cauvery Reservoir within Mysore territory.

2. Since this Government letter, Public Works Department No. 226-1497, dated the 23rd February 1909, was addressed to the Residency, the Kolar Gold Mining Companies have been making pressing representations for the insurance of their power supply, and for additions thereto, by means of a reservoir. The Durbar have undertaken fresh surveys and, for over a year past, have been preparing a project in a new and improved form and are now prepared to commence construction.

3. His Highness the Maharaja's Government have been in correspondence with the Madras Government since November last with the object of obtaining the consent of the latter to the construction of the reservoir. The application for their consent was made in accordance with an understanding* arrived at between the two Governments in 1892, and referred to in Residency letter No. 1022-346-90, dated the 26th March 1892.

*Internal B., April 1892, Nos. 376-78.

The understanding* was to the effect that "the Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right, already acquired and actually existing, the existence, extent and the nature of such right, and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case."

*Internal B., April 1892, Nos. 376-78.

4. For many years past the Mysore Government have intended to construct a reservoir on the Cauvery for developing irrigation in the valley. Attention was diverted from this project for a time when the State undertook the construction of the Marikanave Reservoir in another part of the Province.

Need for storage on the Cauvery.

The construction of the Cauvery Power Scheme for power supply to the Kolar Gold Fields in 1900 led to restrictions being placed on the hot weather supply of the irrigation channels along the river, above the generating station at Sivasamudram.

Since 1905, the river supply has failed at one time or another in almost every hot season. For the past two years an endeavour is being made to improve the hot weather supply by storing small quantities of water at a number of anicuts by raising their crests temporarily with sand bags; but the work is found to be costly and the storage precarious.

For five or six years past, the Mining Companies of the Kolar Gold Fields have been asking for storage to guarantee the minimum river supply needed for power generation in the hot weather. They have recently approached the Durbar with a requisition for an additional supply of 3,000 H. P. at once and 5,000 to 10,000 H. P. in the near future.

5. The Mysore Durbar have plans and estimates ready for a reservoir which is intended ultimately to store 41,500 millions cubic feet.

It is proposed to construct the reservoir dam at a point about 8 miles to the west or upstream side of Seringapatam. The dam will be 6,300 feet long and 124 feet high at the highest point.

Brief outline of what is proposed.

On account of the high level of the lands to be brought under command, the canal has to start from the reservoir at a point 60 feet above the river-bed. The supply below 60 feet (about 4,400 millions cubic feet) will not be available for use after the canal comes into operation. The permanent net available storage of the reservoir, when completed, will therefore be about 37,100 millions cubic feet.

6. It is not proposed to construct the reservoir to the full size at once. In the first stage the dam will be carried only 80 feet above the river bed capable of storing 11,000 millions cubic feet. The water stored at this stage will be used for guaranteeing the power supply and for restoring the former supply to existing irrigation channels.

First stage of the scheme.

In the first stage, that is, with the small reservoir formed by an 80 feet dam, the supply will be drawn from the under-sluices and practically no storage will be left unused.

But the 80 feet dam will be made of the full width required for raising it eventually to the final contemplated height of 121 feet.

It is to the construction of this first stage or 80 feet dam that the sanction of the Government of India is sought at present.

7. In the course of the negotiations referred to in paragraph 3 above, the Madras Government have intimated that they will require for their own use all the water of the river so long as its level at the Upper Anicut (at the head of the Cauvery delta) is not higher than 7 feet on the anicut gauge, and that the Durbar might store only whenever the river rises higher than 7 feet.

Effect of the restrictions suggested by the Madras Government.

A discharge of 7 feet on gauge at the Cauvery anicut is equivalent to 26,680 cubic feet per second; but the printed report of the Madras Government shows that they have not been using more than 12,000 cubic feet per second on an average. All they say is that, because the supply is variable, they must have the largest volume they can use wherever available. Their condition also takes no account of rainfall in the irrigated tract on which, it is acknowledged, the crops partly depend.

According to published reports, nearly half the river discharge or more than 225,000 millions cubic feet runs to waste every year. The supply required for storage for irrigation in Mysore being less than 50,000 millions cubic feet, no reason is assigned why, by reasonable regulation, the Mysore reservoir cannot be filled.

The Mysore reservoir will usually fill by end of July and, from statements which the Madras Government have kindly furnished, it is seen that it is only in three years out of the 20 years ending 1909-10, that the river supply would have fallen short even under the extreme condition suggested by the Madras Government. The following figures give the surplus quantities in those three years:—

Years	Excess quantity available till 31st August	Excess quantity in entire monsoon
	m. c. ft.	m. c. ft.
1894-95	29,360	38,507
1899-1900	24,160	28,797
1905-06	33,908	37,739

Remarks.—The excess quantities are those available at the Bhavani bridge. By proper regulation, these quantities can be made available at the Mysore reservoir.

8. While objecting to storage in the Mysore territory, the Madras Government have, according to published accounts, submitted proposals to the Government of India for a reservoir which is intended to store twice the volume of water and irrigate three times the area of crops contemplated under the Mysore scheme.

If a reservoir of 80,000 millions cubic feet is possible in the Madras Presidency close to and immediately beyond the borders of Mysore, no objection can exist to a reservoir of less than half the capacity within Mysore itself. The Madras project contemplates an additional irrigation of 450,000 acres. If they consider this possible in Madras, an extension of 150,000 acres cannot be reasonably objected to in Mysore territory.

The catchment area above the Cauvery anicut is 27,750 square miles, of which 11,340 square miles or 41 per cent is in Mysore territory.

The total yield of the Cauvery catchment is probably 450,000 millions cubic feet on an average, of which over 75 per cent flows through the Mysore State.

But the area at present irrigated in Mysore is about 108,000 acres or less than one-ninth of the total area irrigated in Madras.

9. Whether regard be had to the area of the catchment or to the amount of water precipitated in the Mysore territory, it is clear that the people of Mysore have the first claim to any extension of irrigation from the river water.

Mysore, with an area of 30,000 square miles, has about 29,000 tanks, showing that the Government and the people of the State have been spending labour and money without stint, from time immemorial, to make this dry plateau habitable.

The Durbar trust that the Government of India will be pleased to safeguard the rights of Mysore to the water-supply of the Cauvery. If that right be taken away, the people of Mysore will be deprived of one important prospective means of protection in times of scarcity.

10. The specific requests of the Durbar are:—

(1) that the construction of the smaller reservoir with an 80 feet dam be at once permitted;

(2) that, if the Government of India desire further enquiry before sanctioning the full size reservoir, the Madras Government may be requested to furnish particulars of the volume of water actually used for irrigation purposes in the Cauvery delta for the past twenty years as required under the Agreement cited in paragraph 3 above; and

(3) that the Government of India will be pleased to withhold their consent to the construction of any reservoir in the Madras Presidency for filling which the Madras Government may hereafter claim a prescriptive right not hitherto possessed by them.

11. If the Government of India propose to depute a special officer to enquire into any details on the spot, the Durbar will be glad to afford him every facility. The Durbar are also prepared to depute one or more of their own officers, if necessary, to explain matters to the officers of the Government of India or Madras.

12. The full details necessary to form an idea of the points under discussion between the Madras Government and the Durbar are given in the recent correspondence between the two Governments of which copies are attached.

The detailed project for the reservoir is also ready and copies will be furnished as soon as it is printed.

13. His Highness's Government request that you will kindly bring to the notice of the Government of India that the Mining Companies are pressing this Government for an answer, that already one working season is nearly gone, and, owing to the prevailing uncertainty and delay, all local effort is paralysed. Unless the Government of India come to the aid of the Durbar and take some such direct action as that suggested in paragraph 11 above, the Durbar apprehend that further time will be lost in the negotiations.

No. 1.—D.O. Letter No. 1503, dated Mysore, 31st October 1910, from T. Ananda Rao, Esq., C.I.E., Dewan of Mysore, to the Hon'ble Col. Hugh Daly, C.S.I., C.I.E., Resident in Mysore.

I am desired by His Highness the Maharaja to bring to your notice a question of some urgent importance, *viz.*, the construction of a reservoir on the Cauvery river within the Mysore State and request you to be so kind as to approach the Madras Government in the matter.

2. According to an old understanding (*vide* Madras G. O. No. 112, dated 21st January 1892), the consent of the Madras Government should be obtained before a new reservoir is constructed within the Mysore State and, in the event of disagreement between the two Governments, the matter has to be settled by arbitration.

3. The main point which concerns the Madras Government is the effect which the construction of the reservoir will have on the discharges of the river Cauvery where it leaves the Mysore territory. A note* prepared by our Public Works Department on the effect of the new reservoir on the discharges of the river at this point is herewith attached.

Vide No. 1-A.

4. The information given in the note will show that the existing electric power scheme has already benefited the summer flow in British territory. This has been brought about at the expense of the fair weather irrigation within the Mysore State.

The new works proposed will contribute further large additions to the river discharge during the hot weather whereby the Madras cultivators will benefit to a corresponding extent without any pecuniary sacrifice on the part of the Madras Government.

5. The Mining Companies on the Kolar Gold Fields have long been asking for a storage reservoir, and they have within the past two or three months informed us that, unless steps are taken immediately in this respect, they would have to make other arrangements and erect additional steam or oil plant of their own as a stand-by. A representative of Messrs. John Taylor & Sons is coming out to Mysore presently, and the Durbar will probably have to decide the question finally by the end of November.

6. The complete project will be forwarded officially as soon as ready, but the note referred to above purports to contain full information on the aspects of the project which concern the Madras Government.

7. If there are any objections on the part of the Madras Government, a specific statement of the same may kindly be obtained and furnished to us to enable us to meet the same. If none, the consent of that Government may be communicated unofficially, and ratification may follow after the complete scheme is ready. As the matter is urgent, would it be possible to obtain the consent or the views of His Excellency the Governor in Council in the course of the next fortnight or thereabouts? His Highness would esteem it a special favour if you would use your good offices to that end.

No. 1-A.—Mysore Chief Engineer's Note, dated Mysore, 15th October 1910, on the Cauvery Reservoir Project in the Mysore State with special reference to its effect on the river supply in the Madras Presidency.

The question of the construction of a large reservoir across the Cauvery has been under consideration and discussion for many years. It was shelved for a time when Government undertook the construction of the large Marikanave Reservoir in the Kistna basin.

In 1908, a project for this purpose was prepared in the rough by the late Captain Dawes, R. E., under the supervision of Mr. McHutchin, M.I.C.E., the late Chief Engineer of this State. The object of the reservoir was threefold, *viz.*:—

(1) to maintain an unfailing supply of water to the power station at Sivasamudram in connection with the present power supply to the Kolar Gold Fields;

(2) to generate additional electric power for mining and other industrial purposes on a large scale; and

(3) to provide irrigation over an extensive tract of country more or less liable to drought and thirsting for water.

2. Government have to spend annually Rs. 40,000 to 50,000, including establishment charges, for conserving the river supply to the power station at Sivasamudram. At present, 10,000 to 11,000 H.P. is generated of which about 9,000 H. P. is supplied to the Kolar Gold Mines. For two or three months in the hot weather, the river supply is liable to fall short of the demand. The requisite supply is, however, maintained partly by restricting the consumption along existing irrigation channels and partly by storing water at the several anicuts by temporary barrage works. It is in order to do away with these makeshifts that a storage reservoir is primarily needed.

Urgent demand for storage for the Kolar Gold Mines.

The Mining Companies have recently notified to this Government their intention to erect reserve steam or oil plant of their own unless immediate steps are taken to provide the necessary storage. A London representative of the Companies is coming out here towards the end of this month and an immediate decision is important.

Object of the scheme.

3. The smaller valleys in the Cauvery catchment have been examined, but no suitable site for impounding water with a masonry dam has been discovered. A small storage reservoir on the main river will be expensive to construct and maintain and, when constructed, it is liable to silt up rapidly. A large reservoir is contemplated because there is already a demand for additional power at the Kolar Gold Mines and further demands are sure to arise in course of time for other purposes.

A high dam is also necessary, because the natural features of the country require that the irrigation canal should start at a level of not less than 60 feet above river-bed. Storage is badly needed for productive irrigation and for the protection of the country during years of extreme drought.

As the existing irrigation in the State is dependent on uncertain rainfall or on a precarious river supply, valuable crops like sugarcane which require water in the hot weather also cannot be cultivated on a large scale from year to year. It is proposed to provide storage for irrigating about 125,000 acres annually and for generating, at or near Sivasamudram, about 5,000 additional H. P. immediately and further supplies when demand arises for the same.

Storage capacity of reservoir.

4. It is proposed to construct a reservoir with its full supply at 110 feet above river-bed at first and to raise it eventually to 118 feet; that is, in the first stage, the net storage will amount to about 28,720 m.c.ft., and eventually to 39,270 m.c.ft.

Catchment intercepted.

5. The total area of the Cauvery catchment in and above Mysore territory is 11,500 square miles of which the reservoir intercepts 4,100 square miles or less than 36 per cent.

Rainfall run-off.

6. This catchment area is made up as under:—

Malnad.—1,881 square miles with an average annual rainfall of 96·63 inches.
Maidan.—2,296 square miles with an average annual rainfall of 30·11 inches.
Total area.—4,100 square miles.
Average annual rainfall.—60·63 inches.

The total rainfall precipitated over the entire catchment is estimated at about 578,000 m.c.ft. The actual run-off may be taken at half of this or about 287,000 m.c.ft.

The discharges from nearly the whole of the *malnad* catchment have been observed at two anicuts for about 14 years. Calculations based on these and on the usual percentages for the *maidan* area below the anicuts give a similar yield, namely, about 251,000 m.c.ft.

The average actual discharge near the present power station at Sivasamudram amounts to about 391,000 m.c.ft. for a catchment area of 8,200 square miles. Of this area, roughly a little more than one-third is *malnad*.

River discharges below Power Station.

7. The power works at Sivasamudram have already led to an increase in the fair weather discharge of the river. Formerly, for three or four months of the hot weather, the river discharge was liable to fall below a minimum of 500 cubic feet per second, the supply maintained at present. In one year, as low as 91 cubic feet per second was recorded.

8. The construction of the reservoir will lead to a further large addition to the fair weather supply of the river in British territory. The whole of the water used for power generation and a portion of that used for irrigation will ultimately find its way back into the river. In future, every increase in power supply at Sivasamudram—the tendency will be always for such increase—will add to the hot weather flow and the ultimate gain to the river in British territory will be very considerable.

Effect on future river supply in British territory.

9. The annexed statement shows the effect of the construction of a reservoir with full supply at 110 feet, on the river discharges at Sivasamudram. The net effect of the proposed reservoir and subsidiary works will be the abstraction of about 31,000 m. c. ft. from the river in a year of average rainfall, representing about one-ninth of the total discharge at the dam site, and less than one-twelfth of that at Sivasamudram.

The figures given in the annexed statement, for the lowest discharges on record for each calendar month of the year, as a result of gauging extending over nine years, are also suggestive.

During the past nine years, the minimum discharge at Sivasamudram in no year fell below 230,000 m. c. ft. The quantity abstracted for storage under the present proposals will therefore represent about one-ninth of the discharge at that point in the worst year on record.

10. There will of course be some diminution in the river supply during the monsoon months, chiefly in June and July; but the total volume contributed to the river from the Mysore territory in this period will be so enormous that the abstraction of the supply needed for filling the reservoir is not likely to have any appreciable effect on the river discharge required for irrigation in the Madras Presidency.

The bulk of the irrigation in the Cauvery delta is situate over 200 miles below the proposed reservoir site.

Should any difficulty be apprehended from the interception of the river supply in June or September, special arrangements may be made to reduce the quantities intercepted in those months. This point may be settled by exchange of views and discussion between the Chief Irrigation authorities of Madras and the Engineer Officers of the Mysore State.

11. Two plans accompany*, one showing the situation of the reservoir at Kannambadi and the existing power works at Sivasamudram and the other the probable longitudinal and cross sections of the proposed dam. In the designs under preparation care will be taken that no room is left for doubt in regard to the strength of the reservoir dam.

* Not printed here.

The sole question for consideration is the effect on the river flow at the point where the river enters the British territory from the Mysore State.

12. The figures and information given above go to show that the reservoir will store a portion of the surplus water of the river when it is not wanted and when it would otherwise run to waste into the sea. The whole of the storage used for power generation, and quite one-fourth of that drawn for irrigation, will return to the river and add to its supply at a time when such supply will be most appreciated by the Madras cultivators.

Conclusion.

As far as can be foreseen, the project will materially improve the fair weather supply in British territory and the cultivators there will reap the benefits of our works without any corresponding pecuniary sacrifice on the part of the Madras Government.

13. The Mining Companies will expect an answer early next month and it is hoped that His Highness' Government will be pleased to settle the general question of the construction of the reservoir in the current month. The working season will commence shortly.

The surveys for the reservoir are practically completed. The detailed project will be submitted for formal sanction as soon as ready.

Accompaniments :—

1. Statement showing river discharges below Sivasamudram before and after construction of proposed reservoir.

2. Plans.

Cauvery Reservoir Project.

STATEMENT showing approximately the effect of the construction of the proposed reservoir on the discharges in the river below Sivasamudram.

(The figures represent million cubic feet.)

Month	Quantities drawn off from the river				Quantities returned to the river			Lowest discharge on record in each calendar month	Present average flow in river	Average flow in river after construction of reservoir	Remarks
	For storage in reservoir	Irrigation direct from river	Allowance for evaporation in reservoir	Total	From irrigation	From power supply	Total				
1	2	3	4	5	6	7	8	9	10	11	12
January ...	...	...	150	150	290	810	1,100	2,544	5,201	6,151	The figures in column 9 give the lowest discharges for each *calendar month* during a period of nine years.
February ...	...	...	150	150	290	1,880	2,170	1,474	2,335	4,115	
March ...	...	...	150	150	290	2,580	2,870	774	1,353	4,073	
April ...	...	...	150	150	290	2,990	3,280	361	1,517	4,647	
May ...	...	...	150	150	290	2,220	2,510	1,131	8,697	11,057	
June ...	5,000	...	150	5,150	290	...	290	8,759	25,027	20,167	
July ...	25,000	5,300	240	30,540	1,330	...	1,330	84,248	135,618	106,408	
August ...	...	5,300	240	5,540	1,330	...	1,330	33,742	99,883	95,673	
September ...	...	5,300	240	5,540	1,330	...	1,330	16,936	43,369	39,159	
October ...	...	2,650	240	2,890	1,330	..	1,330	17,215	35,169	33,609	
November ...	...	...	240	240	1,330	...	1,330	6,435	20,652	21,742	
December ...	...	...	240	240	1,330	...	1,330	3,394	11,343	12,433	
Total ...	...	...	...	50,890	9,720	10,480	20,200	...	390,224	359,534	

No. 1-B (a).— Letter No. 3—1, dated 4th January 1892, from the Secretary to the Government of Mysore, Public Works Department, to the First Assistant to the Resident.

With his letter No. 1-A of 10th June 1890, the Dewan submitted to the Resident a memorandum on the subject of the restoration and construction of irrigation works in Mysore, the right to effect which without restriction had been disputed by the Madras Government. In that letter he urged the Resident to represent the matter in full to the Government of India, in view to a settlement of the points at issue.

2. Colonel Sir Oliver St. John informed the Dewan in April last that the Government of India would prefer the matter to be settled if possible by some understanding between Madras and Mysore, and before leaving Ootacamund this year, he arranged for a conference between officers of the two Governments. Under such circumstances, the Durbar again made endeavours in conference with the Madras Government to arrive at an amicable understanding regarding our future irrigation operations, so that controversy might be obviated in regard of individual works, and a sphere of operations declared in which Mysore projects should be absolutely untrammelled. At the same time, restrictions to be accepted by the Durbar, on certain classes of works on certain rivers and in certain valleys, which might affect prejudicially Madras works beyond the frontier.

3. The rules and schedules which I now forward embody the arrangements which have been come to in an informal manner, by personal discussion, or by demi-official communications, and I am desired to request you will be good enough to move the Resident to now obtain from the Government of Madras their *formal* acceptance of the same. They will then be adopted by Mysore for future guidance of the Irrigation officers.

4. Annexed to the final rules and schedules is printed the demi-official correspondence which led to the modification of the rules after they were first framed and discussed at Ootacamund in May last. These letters will show that the general terms of the settlement have, with an exception, been informally agreed to by both Governments.

5. The exception I allude to is that referred to in the secondary clause to rule V. The decision of the Government of India will be necessary on that point, *viz.*, the existence of a liability on the part of Mysore on account of three large reservoirs now actually under construction, and if such liability exists, the extent of it; but the definite acceptance by Madras of the rules and schedules as now drawn up is desirable before the controverted cases are specially referred.

RULES DEFINING THE LIMITS, WITHIN WHICH NO NEW IRRIGATION WORKS ARE TO BE CONSTRUCTED BY THE MYSORE STATE WITHOUT PREVIOUS REFERENCE TO THE MADRAS GOVERNMENT.

I. In these rules,—

(1) "*New Irrigation Reservoir*" shall mean and include such irrigation reservoirs or tanks, as have not before existed, or having once existed, have been abondoned and been in disuse for more than 30 years past.

(2) A "New Irrigation Reservoir" fed by an anicut across a stream shall be regarded as a "*New Irrigation Reservoir*" across that stream.

(3) "Repair of Irrigation Reservoirs" shall include, (*a*) increase of the level of waste weirs and other improvements of existing irrigation reservoirs or tanks, provided that either the quantity of water to be impounded, or the area to be irrigated, is not more than the quantity previously impounded, or the area previously irrigated, by them; and (*b*) the substitution of a new irrigation reservoir for and in supersession of an existing irrigation reservoir but in a different situation, or for and in supersession of a group of existing irrigation reservoirs, provided that the new work either impounds not more than the total quantity of water previously impounded by the superseded works, or irrigates not more than the total area previously irrigated by the superseded works.

(4) Any increase of capacity other than what falls under "Repair of Irrigation Reservoirs" as defined above shall be regarded as a "New Irrigation Reservoir."

II. The Mysore Government shall not, without the previous consent of the Madras Government, or before a decision under rule 4 below, build (*a*) any "New Irrigation Reservoirs" across any part of the thirteen main rivers named in the appended schedule A, or across any stream named in schedule B below the point specified in column 5 of the said schedule B, or in any drainage area specified in the said schedule B, or (*b*) any "New anicut" across the minor streams of schedule A, *viz.*, 4 to 9, and 14 and 15, or across any of the streams of schedule B, or across the following major streams of schedule A, lower than the points specified hereunder:—

Across I. Tungabhadra—lower than the road crossing at Honnali,
„ 10. Cauvery—lower than the Ramaswami anicut, and
„ 13. Kabbini--lower than the Rampur anicut.

III. When the Mysore Government desires to construct any "New Irrigation Reservoir" or any new anicut requiring the previous consent of the Madras Government under the last preceding rule, then, full information regarding the proposed work shall be forwarded to the Madras Government and the consent of that Government shall be obtained previous to the actual commencement of work. The Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the existence, extent, and nature of such right, and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case.

IV. Should there arise a difference of opinion between the Madras and Mysore Governments in any case in which the consent of the former is applied for under the last preceding rule, the same shall be referred to the final decision either of Arbitrators appointed by both Governments, or of the Government of India.

V. The consent of the Madras Government is given to new irrigation reservoirs specified in the appended schedule C, with the exception of the Srinivasasagara new reservoir across the Pennar, the Ramasamudram new reservoir across the

Chitravati, and the Venkatesasagara new reservoir across the Papaghni. Should, owing to the omission of the Mysore Government to make or maintain these works, in a reasonably adequate standard of safety, irrigation works in Madras, themselves, in a condition of reasonably adequate safety, be damaged, the Mysore Government shall pay to the Madras Government reasonable compensation for such damage.

As regards the three new reservoirs excepted above, the admissibility of any compensation from Mysore to Madras on account of loss accruing to Madras irrigation works from diminution of supply of water caused by the construction of the said works, will be referred to the Government of India whose decision will be accepted as final, and should such compensation be decided to be admissible, the decision of the Government of India as to the amount thereof will be accepted, after submission to them of the claims of Madras which should be preferred in full detail within a period of five years after the completion of said works.

VI The foregoing rules shall apply as far as may be to the Madras Government as regards streams flowing through British territory into Mysore.

SCHEDULE A.

	Main rivers	Remarks.
1.	Tungabhadra	... ..
2.	Tunga	Tributary of the Tungabhadra.
3.	Bhadra	Do do.
4.	Hagari or Vedavati	Do do.
5.	Pennar or Northern Pinakini..: ...	.....
6.	Chitravati	Tirbutary of the Pennar or the Northern Pinakini.
7.	Papaghni	Do do.
8.	Palar	.....
9.	Pennar or Southern Pinakini... ...	.....
10.	Cauvery	.....
11.	Hemavati	Tributary of the Cauvery.
12.	Lakshmantirtha	Do do.
13.	Kabbini	Do do.
14.	Honhole (or Suvarnavati)	Do do.
15.	Yagachi, up to the Belur bridge ...	Do Hemavati.

Schedule B.

A list of the Minor Streams and Catchments in Mysore Territory on which no new Irrigation Reservoirs are to be built within the limits specified, without previous reference to the Madras Government.

Serial number in Schedule A.	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new Irrigation Reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate).	Remarks
1	2	3	4	5	6	7
I	Tungabhadra	1 (a)	Choradi or Kumadvati	Up to the bridge on this river on Honnali-Shikarpur road.	10 miles	.....
		1	Sulikere-halla	The bund of Sulikere tank	16 ,, ...	The Sulikere tank seldom discharges. This stream joins the Tungabhadra in Mysore territory.
		2	Sagali-halla	Up to the boundary line of the Channagiri taluk...	10 ,, ...	Above this point there are numerous existing tanks, and the run-off from these smaller catchments is of no appreciable importance to floods in the Tungabhadra river.
		3	Sarati-halla	As far as the boundary line of the Kakkargola and Avargola villages.	9½ ,, ...	A stream of insignificant importance to floods in the Tungabhadra river. The stream joins the Tungabhadra river in Mysore territory.
		4	Branch of Sarati-halla from east ..	Up to Kadaji tank bund	16½ ,, ...	Catchment above the Kadaji tank small and insignificant.
		5	North Hagari	Up to boundary of Chitaldrug taluk	12½ ,, ...	There are no existing Madras works on this branch of the Tungabhadra.
		6	Branch of Hagari	Up to Anaji tank bund	10 ,, ...	
		7	Sokke-halla	Up to the Hoskere tank bund	9 ,, ...	No existing Madras works on this stream before it joins the North Hagari. Catchments above Hoskere and Kyasenhalli tanks very small and insignificant.
		8	Branch of Sokke-halla	Up to the Kyasenhalli tank bund	9 ,, ...	
		9	Jiganhalli tank (Madras) catchment	The whole of the outlying bit of Mysore territory which drains into the Madras tank.	.....	This is an outlying bit of Mysore territory in Latitude 14-55'; Longitude 76-38'.
		10	Anantapur tank (Madras) catchment.	The whole of the area of the extreme northern portion of the Molakalmuru taluk in Mysore which drains northwards into the Anantapur (Madras) tank catchment.	.....	There are existing Madras tanks below, and the whole area which drains into such tanks is included.
IV	Vedavati or Hagari ...	11	Chinna-Hagari	Up to where the stream crosses the frontier near Rangaiyandrug.	16 miles	No existing Madras works affected. This stream joins the main river about 8 miles beyond the frontier.
		12	Sherikola-halla or Nagalapura tank (Madras) catchment.	The whole catchment area in Mysore territory ...	.....	Affects the supply to Madras tank below.
		13	Rangasamudram tank (Madras) catchment.	The whole area of catchment of the tank in Mysore territory.	.....	The stream from this catchment leaves Mysore territory in Latitude 14-7'-30" and Longitude 76-48'-30".
		14	Yaradkere tank (Madras) catchment.	Do. do.	.....	The Yaradkere in Madras is in Latitude 14-30'; Longitude 76-57'-3".

A. Ma. 8-a

A list of the Minor Streams and Catchments in Mysore Territory on which no new Irrigation Reservoirs are to be built, etc.—*contd.*

Serial number in Schedule A	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new Irrigation Reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate).	Remarks
1	2	3	4	5	6	7
IV	Vedavati or Hagari—*contd.*	15	Main stream of Talak drainage ...	Up to the bridge over this stream on the Salem-Bellary road.	15½ miles	The road is a convenient point for a limit. No Madras works affected. This stream joins the Vedavati river within Mysore limits.
		16	Main stream of the Dodderi drainage.	Up to the boundary of the Hosahalli village ...	17½ ,, ...	Latitude 14-21'; Longitude 76-19'. No existing Madras works affected. This stream joins the Vedavati river within Mysore territory.
		17	Virapasamudram and Amarapur tank (Madras) catchments.	The whole area of catchment of this series in Mysore territory.	.....	This area represents a large proportion of the Pavagada taluk of Mysore.
V	Pennar or Northern Pinakini.	18	Mulkalkara tank (Madras) catchment.	Do do ...	.....	This Madras tank is situated in Latitude 14-8'; Longitude 77-26'-20"-
		19	Ruddam tank (Madras) catchment.	Do do ..	.....	A considerable area in the north of the Maddagiri taluk of Mysore is on this catchment.
		20	Virapasamudram tank (Mysore) catchment.	Do dc ...	.....	This terminal tank is in S. E. corner of the Pavagada taluk of Mysore, but there are some Madras tanks above in the Madaksira Tahsildari. The catchment excluded from Mysore operations is chiefly in the north of the Maddagiri taluk.
		21	Purghi tank (Madras) catchment ...	Do do ...	.....	The catchment excluded from Mysore operations is in the north of Maddagiri.
		22	Jayamangali river	Up to its junction with the Garudachala stream ...	28 miles	The river above this point is of minor importance to Madras.
		23	Suvarnamukhi branch of Jayamangali.	Up to site of Rampur anicut	25 ,, ...	Joins the Jayamangali a few miles below this point.
		24	Kumadvati	Up to site of anicut feeding the Kadagatur and Gundagal tanks in Mysore.	9½ ,, ...	This stream joins the Pennar on the Mysore frontier.
		25	Chaulur tank (Madras) catchment.	The whole direct catchment of this tank in Mysore territory.	.....	This Madras tank is on the west bank of the Pennar just outside Mysore territory.
		26	Western or Thondebhavi branch of the Pennar or N. Pinakini.	Up to its source	27 to 30 miles ...	.....
		27	Central or Varvani branch of the Pennar or N. Pinakini.	Do	25 miles	.....
		28	Hindupur tank (Madras) catchment.	The whole area of catchment of this series in Mysore territory.	.....	An important and large area of the Goribidnur taluk is here excluded from Mysore operations in a part where water for irrigation is much appreciated.
VI	Chitravati	29	Kushavati stream (Bukkapatna tank catchment in Madras).	Up to site of Daparti anikat	10½ miles	The large Gudibanda tank in Mysore and the 20 smaller tanks above impound a very large proportion of the upper catchment already.
		30	Chitravati catchment (Bukkapatna tank catchment).	The whole area to the north of the Chelur-Bagenhalli road.	.....	This portion of the Chitravati catchment being more hilly and barren, the run-off is greater than in the more cultivated and level catchment to the south of the Chelur-Bagenhalli road.

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A list of the Minor Streams and Catchments in Mysore Territory on which no new Irrigation Reservoirs are to be built, etc.—*concld.*

Serial number in schedule A	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which, or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
VII	Papaghni river ...	31	Vandaman-halla	Up to Naremadipalli tank	9½ miles ...	No Madras works affected up to the junction of this stream with the Papaghni river.
		32	Guntpalli tank (Madras) catchment.	The whole area of catchment in Mysore territory ...	...	This Madras tank is situated just above the large Vyasasamudram tank.
		33	Sadam tank (Madras) catchment.	The main stream up to its source	17 to 18 miles ...	This Madras tank, the waterspread of which is partly in Mysore territory, drains into the Papaghni river just above the Vyasasamudram tank.
		34	Kotagal branch of the Papaghni ...	Up to Kotagal tank	,, ...	The catchment above Kotagal tank is comparatively small and unimportant with [numerous small tanks already on it.
		35	Tippasamudram tank (Madras) catchment.	The Narasanpalli-Digavakote stream up to Digavakote-Pathacheravu tank; and the Marasanpalli Gundedu stream up to Gundedu tank.	9½ miles ...	These are the only two important streams on this catchment, and above these terminal tanks, there are a large number of small tanks on the small drainages. These terminal tanks are only situated from 4 to 5 miles from the watershed of the Palar.
					13 ,, ...	
		36	Rangasamudram tank (Madras) catchment.	Adgal stream up to Adgal-Vasantanaikankere tank.	6½ ,, ...	The Adgal tank is situated 6 miles from the water shed, and there are numerous tanks in this distance.
				Kurigepalli branch stream up to the Kurigepalli tank.	4½ ,, ...	The Kurigepalli tank is only 4 miles from the watershed, and there are some 18 small tanks above it.
VIII	Palar river	37	Nangli (Mysore tank) drainage ...	Main stream up to its source	17½ ,, ...	There are 12 Mysore tanks situated on this main stream.
		38	Shettikal (Mysore) tank drainage.	Do	10 ,, ...	There are about 5 existing Mysore tanks and 1 breached tank on this main stream.
		39	Malinayikanhalli (Mysore) drainage.	Do	6½ ,, ...	There are 4 existing Mysore tanks on this main stream.
		40	Vegmadgu (Mysore) drainage ...	Do	7 ,, ...	Do Do
		41	Tailur tank (Mysore) drainage ...	Do	23 ,, ...	There are 10 Mysore tanks on this important branch of the Palar, the terminal tank being 12½ miles from the frontier.
IX	Pennar or South Pinakini ...	42	Vrushuvavati river	Main stream up to Koppa (or Kuppam tank) ...	16	There are 76 tanks above the Koppa tank which is only some 12 miles from the watershed.
		43	Budikote stream	Main stream up to Thimmanayakanhalli tank ...	21 ,, ...	There are 146 tanks above this terminal tank which is only about 12 miles from the watershed.
		44	Masti catchment	The whole area of catchment in Mysore territory ...	.....	About 45·40 square miles in area in which there are 63 tanks in existence.
		45	Kadgodi drainage	Main stream up to its source	26 ,, ...	There are 10 Mysore tanks on this main stream now in use, most of them of large size.

SCHEDULE C.

A list of works already in progress, and which are to be allowed to be completed, although they would be barred by the proposed rules for restriction of Mysore operations.

Serial number in schedule A.	Main river drainage	Serial number of stream or catchment in schedule B.	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
					Rs.	Rs.	
I	Tungabhadra	.....	.....	.....	.....	...	No works in progress on these catchments which are affected by the proposed rules submitted to Madras.
II	Tunga	.....	.....	.....	.....	...	
III	Bhadra	.....	.....	.....	.....	...	
IV	Hagari or Vedavati ...	17	Restoration of the Arsikere Hampaiyandurga tank.	May 1889 ...	4,362	..	The estimate provides for raising the weirs by 2 feet, and increasing capacity from 107 to 163 units. Work in abeyance owing to objection raised by Madras Government. But it is not intended to irrigate more than the area of land (189 acres) assessed as wet by the Revenue Survey.
		17	Restoration of the Arsikere Gujjarappankere.	Do ...	3,582	...	The estimate provides for raising the weir by 1 foot and to increase the capacity from 149 to 186 units. The raising of the weir by 1 foot will not do more than compensate for the silting up of the bed for years.
V	Pennar or Northern Pinakini.	Main stream ...	New reservoir (Srinivasasagara) across the river near Kotagarahalli.	July 1888 ...	99,006	69,696	This new masonry dam with earthen bund on flanks is two thirds completed. No Madras works affected. The capacity of the tank will be 610 units, and it is intended to irrigate 800 or more acres. This work is referred to by Colonel H. Smalley, R. E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation, Madras.
		28	Restoration and improvement of Myala tank.	September 1887 ...	(Original estimate) 14,452	...	The capacity was increased from 95 units to 318 units and the work is nearing completion. This tank is on the Hindupur (Madras) tank catchment, but only has a catchment of 38·80 square miles of its own.
				December 1889 ...	(Revised estimate) 17,168	13,130	
		28	Raising the weirs of the Mahamalesvara tank.	September 1890 ...	3,165	865	This is a small tank above the Myala noted above. The estimate provides for increasing the capacity of the tank from 62 to 102 units, the former capacity having proved insufficient to irrigate the 198 acres of assessed wet lands. No increased area of irrigation is provided for. The total catchment above this tank is only 3 square miles.
		28	Restoring the Manivala tank.	February 1889 ...	4,094	2,860	The tank weir is to be raised 2 feet, and capacity increased from 139 to 211 units, but only in order to impound sufficient water to irrigate the tanks original atchkat of 350 acres.
VI	Chitravati	Main stream ...	New reservoir (Ramasamudram) near Periyasandra.	May 1888 ...	75,077	51,824	This reservoir is noticed by Colonel H. Smalley, R. E., in his No. 674 dated 10th June 1891, to Chief Engineer for irrigation. It is to have a capacity of 1,207 units to irrigate 1,200 acres. The catchment area above the tank is 47·61 square miles.
		30	Restoration of the Malasandra-Rachevar tank	December 1888 ...	4,742	4,724	Weirs of the tank were raised 2 feet, increasing the capacity from 105 units to 159 units. It is not intended to increase the area originally irrigated, 258 acres. The capacity of the tank is even now insufficient unless the tank fills 1½ times in the year. Work is nearly completed.

A list of works already in progress, and which are to be allowed to be completed, although they would be barred by the proposed rules for restriction of Mysore operations—*contd.*

Serial number in schedule A	Main river drainage	Serial number of stream or catchment in schedule B	Name of work in progress	Date on which work was sanctioned	Amount of estimate in rupees	Expenditure incurred to end of March 1891	Descriptive remarks
1	2	3	4	5	6	7	8
VII	Papaghni river ...	Main stream ...	New reservoir (Venkatesasagara) near Devaganhalli.	June 1888	Rs. 60,985	Rs. 28,423	This work is noticed by Colonel H. Smalley, R. E., in his No. 674, dated 10th June 1890, to Chief Engineer for Irrigation. The tank will impound 517 units as designed, and will perhaps irrigate 750 acres if it fills 1½ times. The catchment above the tank is 61 square miles.
		Main stream ...	Restoring the Burudagunte anicut, channel and tank.	December 1888 ...	25,575	17,350	This work consists in (1) building a masonry anicut with the usual earth flank bunds across the main stream, (2) restoring the old channel therefrom, and (3) restoring the Burudagunte Thimmasani tank and increasing its capacity from 111 units to 167 units. This project is also noticed by Colonel Smalley in his report No. 674, dated 10th June 1890.
			Restoring the Timmanayakanhalli Agrahar tank.	August 1888 ...	16,776	13,234	Noticed also in Colonel Smalley's letter above quoted. This is a restoration of an old breached tank 26 miles up the main stream and 2 miles above the Chintamani-Bagenhalli road. The tank is to impound 240 units and irrigate 250 acres as against its original atchkat (irrigable area) of 330 acres as per Revenue Survey maps. Work is nearing completion.
		35	Restoring Kotekallur tank.	April 1888... ...	6,564	5,690	This project consists in the restoration of a tank which breached in 1874, and for increasing its capacity from 25 to 80 units. It is 6 miles from the frontier on the Tippasamudram (Madras) tank catchment.
VIII	Palar river	37	Restoring the Byatnur Nagavara tank.	September 1888 ...	14,300	8,102	This is the terminal tank of the series. The capacity being increased from 152 to 320 units, it is only intended to irrigate the original area of 365 acres included in the atchkat.
		37	Restoring Marandhalli tank	March 1886, Revised Estimate in July 1888.	5,345	5,254	The project provides for raising the weirs 3 feet and increasing the capacity from 121 to 186 units, to irrigate perhaps 250 acres. Work is nearing completion.
		41	Restoring Jagalkashti Dodkere tank.	April 1888, revised estimate in January 1890.	7,246	7,210	Project provides for raising the weirs 3 feet and increasing capacity from 50 to 107 units. Work is nearly completed. No Madras works affected.
IX	Pennar or Southern Pinakini.	Main stream ..	Restoring Bhadram tank...	April 1888... ...	21,689	15,033	The project provides for raising the weirs of this tank by 3 feet and increasing the capacity from 701 units to 1,225 units. The work to the tank itself is nearly completed and only channels have now to be extended.
		41	Restoration of Santehalli tank.	November 1889 ...	7,480	4,076	This tank is in the Masti catchment. The weirs are to be raised 3 feet, and capacity increased from 93 to 154 units. No Madras works are affected.

No. 1-B (b).—Letter No. 1022—346-90, dated 26th March 1892, from the First Assistant to the Resident in Mysore, to the Secretary to the Government of Mysore, Public Works Department.

With reference to your letter No. 3/1, dated the 4th January 1892, I am directed to inform you that the rules and schedules in connection with the restoration and construction of irrigation works in Mysore, forwarded herewith, are accepted by the Madras Government. (*Not printed.*)

No. 2—Copy of a demi-official letter, dated Madras, the 12th November 1910, from the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch, to the Honourable the Resident in Mysore.

With reference to your demi-official letter of the 1st instant, I am directed to inform you that, before the Madras Government can agree to the construction of the proposed reservoir in Mysore, they require some further details as to its scope and conditions of working to ascertain its probable effect upon the existing wet cultivation under the Cauvery.

Also, as the British Cauvery project is completely worked out and just about to be submitted to the Government of India, the Madras Government desire, before submitting it, to know the probable effect of the Mysore project upon it.

I am directed to suggest that it will facilitate an early settlement of the question if the Chief Engineer, Mysore, could conveniently be deputed to come to Madras and discuss the details of both projects with the Chief Engineer for Irrigation, Madras.

I am therefore to request that, with the permission of the Mysore Durbar, Mr. Visvesvaraya may come to Madras—say about the 17th instant. In the hope that the proposal will commend itself to the Durbar, the Chief Engineer for Irrigation is addressing the Chief Engineer, Mysore, direct and informing him what further information is required to enable the Madras Government to settle the question.

No. 3.—D.O. letter No. 7429, dated Bangalore, 7th December 1910, from the First Assistant Resident in Mysore, to the Dewan of Mysore.

With reference to the correspondence ending with your D.O. letter No. 1581, dated the 14th November 1910, regarding the proposed construction by the Durbar of a reservoir on the Cauvery river, I am desired to forward herewith, for the information of the Durbar, a copy of a D.O. letter No. 386/10, dated the 6th December 1910, from the Joint Secretary to the Government of Madras, Public Works Department, on the subject.

A copy of the note of the Chief Engineer for Irrigation, Madras, which is referred to in Mr. Clerk's letter, with other papers bearing on the subject, will be forwarded on receipt.

No. 3-A.—D.O. letter No. R.O.C. 386-1—10, dated the 6th December 1910, from the Joint Secretary to the Government of Madras, Public Works Department (Irrigation), to the Honourable the Resident in Mysore.

I am directed to reply to your D.O., dated 1st ultimo, regarding the proposed construction by the Mysore Durbar of a reservoir on the Cauvery river.

2. I am to say that existing interests vested in the very large area of land in British territory irrigated by the Cauvery are of great magnitude and very careful consideration by the Madras Government will be necessary before they can agree to the construction of a reservoir which must necessarily affect the supply of water to

that territory. His Excellency the Governor in Council is accordingly quite unable to express any opinion on the Durbar's project until he has had an adequate opportunity for the examination of the complete scheme for construction of the reservoir with full details of the design of the reservoir itself, as also of the design and scope of the irrigation system and of the rules for working it.

3. His Excellency the Governor in Council has very carefully considered the sketch of the proposed scheme given in note by the Chief Engineer, Mysore, which accompanied your letter under reply and finds that, in its present shape, it cannot be accepted, since, as shown in the note of the Chief Engineer for Irrigation, Madras, of which I enclose a copy, the proposals will involve very serious and detrimental interference with existing interests in British territory.

4. There is ample reason to apprehend that the scheme will in any case prove injurious to these interests, but there is a further risk involved in the probability of the irrigation portion of the scheme being ultimately constructed only on protective grounds.

As pointed out in paragraphs 7-9 of the note of the Chief Engineer for Irrigation, this is likely to result in a maximum demand upon the reservoir at a time when compliance with it will be most harmful to the existing irrigation lower down the river. This is a contingency of the gravest nature and indicates the necessity for the utmost circumspection on the part of the Durbar in framing its proposals and on the part of this Government in scrutinizing them.

5. Nor is it only in regard to the scheme itself that His Excellency the Governor in Council desires further opportunity for consideration. It is equally necessary that he should be informed of the regulations for working the system. The conditions of the Cauvery irrigation are such that it is only by means of the most elaborate and stringent rules for regulating the issue of water that any reservoir scheme of the nature of that proposed by the Durbar can be worked without injury to existing irrigation. It will, therefore, be necessary that the Durbar should frame a code of rules beforehand and should be able to satisfy this Government that they can at all times be enforced.

6. In conclusion, I am directed to state that His Excellency the Governor in Council is most anxious not to oppose proposals of this nature put forward by the Durbar. On the contrary, it would give him the greatest possible satisfaction if he were able to meet their views.

At the same time, on account of the very important interests involved, it is clear that the final settlement of any such scheme as the one now put forward cannot be arrived at before the lapse of several weeks, if not months.

7. Should the Durbar consider that a settlement can be facilitated by personal consultation between the Chief Engineer for Irrigation, Madras, and the Chief Engineer, Mysore, I am directed to state that His Excellency the Governor in Council will welcome such a course.

No. 3-B.—Note by the Hon'ble Mr. C. A. Smith, Chief Engineer for Irrigation (Acting Chief Engineer, Public Works Department).

The note by the Special Superintending Engineer, dated 15th November 1910, correctly describes the existing conditions and I agree with the opinions therein expressed.

2. The second note dated 17th November 1910, which accompanies the draw-off tables, shows how the latter have been prepared and upon both notes I have to make the following remarks.

3. The supply of the Cauvery is a very intermittent one and it is therefore necessary under existing conditions to take the fullest possible advantage of the available supplies. It has therefore been the standing rule for many years past to pass into the delta the equivalent of 7 feet on Cauvery Dam whenever available. Further, for the reasons given in the Special Superintending Engineer's note, it is also necessary to provide for the direct irrigation between the Cauvery bridge at Bhavani and the Cauvery Dam.

Any scheme for a reservoir higher up the Cauvery which reduces the above supply without giving it back again just at the time it is required, cannot but interfere materially with existing irrigation and it is solely on this account that the British Cauvery project provides for a very much larger reservoir than would otherwise be necessary.

For the above reasons, the proposals as now put forward by the Mysore Durbar are quite inadmissible. The Special Superintending Engineer's draw-off tables show that water can be impounded by Mysore and the periods during which it may be so impounded; but, as indicated in his note, no allowance has been made for Coleroon irrigation and it will probably be necessary on this account to make a reduction in the quantities of water available.

Figures are not at present available for this; but those given by the Superintending Engineer will, I think, be sufficient to enable Mysore to reconsider their proposals.

4. It is in my opinion absolutely necessary for Mysore to work out their scheme in full detail, not only for the reservoir, but also for the irrigation scheme and to prove on paper to the satisfaction of the Madras Government that it can be carried out and successfully operated without detriment to existing British interests.

It is also obviously necessary in their own interests to show that the scheme will not fail for power purposes.

5. The tables show clearly that this is not the case with their present proposals as, out of twenty years for which figures are available, the reservoir fails for power purposes in the three years 1894-95, 1899-00 and 1905-06. The tables are worked out for the full ultimate capacity of the Mysore reservoir, *i.e.*, 39,270 millions cubic feet, because, with the smaller capacity of 28,720 millions cubic feet, there would also have been failures in four other years, *i.e.*, 1890-91, 1896-97, 1904-05 and 1907-08.

6. It may also be pointed out that, if the figures of discharges at Sivasamudram are greater than those at Bhavani bridge, the supplies available for impounding at Kannambadi will be still further reduced and the results will be worse still.

7. As regards the irrigation portion of the scheme, I have examined the maps kindly supplied to me direct by Mr. Visvesvaraya. The levels marked on the map clearly indicate that, on account of the undulating nature of the country and the large number of cross drainages, the canal will be a very costly one to construct.

The line marked on the map is, I believe, the same as that proposed for the larger irrigation scheme of 300,000 acres previously put forward by Mysore and I do not know how much of it is now proposed to be carried out in order to provide for the irrigation of the area now mentioned, *i.e.*, 125,000 acres.

It is seen from the reports by the late Captain Dawes, R.E., and the note by the Chief Engineer, Mysore, previously received, that it was only intended to irrigate $\frac{5}{12}$ of the irrigable areas commanded, *i.e.*, 300,000 acres, out of about 700,000 acres, but the gross area commanded is believed to be very much greater than this.

I have no definite information as to the situation of the 125,000 acres now proposed for irrigation; but I infer from the nature of the country as indicated by the maps, from the reasons given in previous reports against concentration of irrigation and from the fact that it is now proposed to irrigate chiefly sugarcane and paddy which means, at any rate for the former and probably also for the latter, selection of the best lands available, that the irrigated area is likely to be considerably scattered. This will mean great lengths of branch and distributary channels and a low irrigating duty for the water.

The Madras Government are only indirectly concerned with the first and with the resulting additional expense as will be shown in paragraph 8 below, but they are very much concerned with the duty of the water and I consider that Mysore should supply full information to justify whatever duties are ultimately proposed by them.

8. It is also noticed that, whereas the original irrigation scheme was stated to be a protective one, it is inferred from the note on the present scheme by the Chief Engineer, Mysore, that it is intended to make it productive by the irrigation of sugarcane.

Whether the irrigation scheme with such a costly distribution system can under any circumstances be made productive is in my opinion extremely doubtful, but this is chiefly a matter for the Mysore Government. I refer to it here, because, if, as I anticipate will be the case, it is found necessary to design the project on protective lines, it is likely to result in a heavy demand upon the reservoir in bad years and these years may be just the ones in which it will interfere most with the river supplies.

Experience elsewhere in Madras has shown that, in a bad year of rainfall, not only is the supply actually required for the legitimate areas of wet cultivation increased, but that there is a tendency for raiyats to take water for areas not usually irrigated in order to save their dry crops.

If, as I have inferred above, the areas now proposed for paddy and sugarcane are scattered, it is not unlikely that the water may be illegally abstracted on the way for saving dry crops, and if such abstraction is possible, Mysore with the best intention may find it difficult to prevent it.

For the above reasons, I am of opinion that it will not be reasonable to expect the Madras Government to agree to any irrigation scheme which has not been worked out in full detail.

This full detail is required not only for the purpose of locating the irrigated area and for fixing a suitable duty, but also for the purpose of satisfying the Madras Government that it is practicable for the Mysore Government to limit the amount of draw-off from the reservoir to what it ought to be. It is obvious that if, for the reasons given above, water is abstracted before it reaches the legitimate wet area, the latter will suffer unless more water is supplied. It has been stated that there must be definite rules drawn up for the working of the reservoir, but the temptation to depart from the rules under conditions such as indicated above will be very great and the Madras Government must safeguard themselves against departure from the rules either intentionally or unintentionally on account of the practical impossibility of enforcing them.

9. It is therefore in my opinion very necessary that the scope of the irrigation scheme should be absolutely limited to the area for which water can be spared in the worst year. I am also of opinion that this limitation must be automatic, *i.e.*, that the distribution system must be designed for the above area and be practically incapable of expansion in years of drought.

10. To enable Mysore to reconsider their proposed irrigation scheme, I now enclose a copy of the gauge* readings for twenty years at Bhavani bridge and the corresponding table of discharges based upon actual observations. By comparing the daily discharges at Bhavani bridge with those at Sivasamudram, Mysore can calculate for themselves what water they can impound without detriment to British interests.

*Gauge readings for nine years from 1901 to 1909 only have been enclosed.

Mysore should also supply us with similar statements of discharges at Sivasamudram together with full information as to how they have calculated their discharges.

No. 3-C.—Note by the Superintending Engineer on Special Duty on proposals for constructing a reservoir by Mysore State on the Cauvery above Sivasamudram, dated 15th November 1910.

The areas in British territory below Sivasamudram irrigated by direct flow by the Cauvery are approximately as noted below :—

		Acs.
Above Bhavani bridge		1,000
Between Bhavani bridge and Upper Anicut		61,500
Below Upper Anicut		1,005,000
	Total ...	1,067,500
Add French territory wet cultivation below Upper Anicut ...		27,000
	Total ...	1,094,500

It will be clear from this that the interests involved in maintaining undiminished the supply of water to such an area are very great. The problem to be considered is how and to what extent is it possible to work a reservoir in Mysore fed by the Cauvery without any tangible risk of diminishing supplies of water required by the abovementioned existing areas.

2. It will be evident that this can only be done by restricting impounding to such water as is not required for and will not be used for this area.

Such supplies may be divided into two classes :—

(*a*) Flow which is in excess of what the total irrigation system can conveniently carry for irrigation purposes.

(*b*) Supplies flowing at a period of year when there is no demand for irrigation water.

The flow of March, April and May is classed under (*b*).

Under (*a*) is classed the water now surplused in times of superabundant flow into the sea.

3. For purposes of computation of supply, the flow through Bhavani bridge on the Cauvery is taken as the head of the irrigation system and we have daily gauge readings and computations of flow from these readings for 20 years.

We have also for 20 years the computations of daily discharge at the Upper Anicut which is the head of the delta systems.

The system of regulators at the latter place gives great power of control of the water and the existing working rules lay it down that all water is to be passed for irrigation of the Cauvery Delta up to a gauge reading of 7 feet on the Cauvery Dam which connotes a normal discharge of 2,300 m.c. ft. daily.

Flow in excess of this is passed through the Upper Anicut into the Coleroon.

Such flow feeds the Lower Anicut system and the Viranam tank to the extent of the carrying capacity of the feeding channels, but the great majority of it surpluses into the sea.

For purposes of preliminary computation, it may be considered that the whole of any excess over the flow 2,300 m. c. ft. daily at the Upper Anicut is surplus water.

4. It has now to be considered to what extent the draw-off and losses by percolation and evaporation between Bhavani bridge and the Upper Anicut affects the question and also the effect of the tributaries of the Cauvery joining it in these limits in supplementing the supply.

The principal tributaries are the Bhavani, the Noyel and the Amravati and each of these rivers has considerable extents of direct flow irrigation dependent on it, the total areas being :—

		Acs.
Bhavani		39,000
Noyel		14,500
Amravati		44,000
	Total ...	97,500

5. In the years of good or average rainfall in the southern districts and in the Anamalai and Nilgiri Hills, these tributary rivers in addition to supply of the areas above contribute very materially to the Delta irrigation and the flow of the Aganda Cauvery at the Upper Anicut is generally in excess of that at the Bhavani bridge.

This is the normal state of affairs.

In a bad year, however, the flow of the tributary streams is irregular and intermittent and they cannot be depended on.

In such seasons the whole flow of the tributaries is taken up for the direct supply of the existing channels under them and the flow at Bhavani bridge in addition to having to fully supply the Deltaic Irrigation in Tanjore and South Arcot has to supply the direct irrigation for the 61,000 odd acres above the Upper Anicut as well as the losses in transmission.

6. Taking the record of half-monthly discharge for 20 years of the Cauvery at the Upper Anicut and at Bhavani bridge, it is found that it frequently happens that the discharges for half a month between 1st August and 15th November is greater at Bhavani bridge than at the Upper Anicut.

7. In this period of 3½ months in the 20 years for which discharge tables are drawn, this occurs for 28 half-months out of the 70 or 40 per cent of the period.

Further, as must be expected, this occurs most in the worst years

In the three worst years of the period, *viz.* ....{1899-00, 1904-05, 1905-06}

in the months July to December (the six chief irrigation months) the total flow at Bhavani bridge for half month exceeds that of the Aganda Cauvery at the Upper Anicut in 16 half-months out of the total of 36 or 44 per cent of the period.

In 1904-05 the total flow of the whole irrigation season June to January at Bhavani bridge was 337,267 m.c.ft. against the total flow in the same period of the Aganda Cauvery of 329,269 m.c.ft.

Thus it is clear that it is insufficient to make provision for a flow of 2,300 m.c.ft. at Bhavani bridge as a limit above which impounding may be allowed and that it is necessary in order to safeguard existing British irrigation to allow an excess during the 3½ months, 1st August to 15th November.

Studying the relative discharges recorded, it is considered that an additional 10 per cent or a total 2,530 m.c.ft. per day will, during these three and a half months, suffice to safeguard the interests of the lower irrigation, while 2,300 m.c.ft. will be fixed for the remainder of the irrigation months.

8. For the purpose of Mysore project, it would be necessary to have a gauging point for flow in the vicinity of the reservoir, as Bhavani bridge is too far below the site to be the guide. The anicut at Sivasamudram would, it is believed, be in sufficient proximity.

For the purpose of the working tables, it has been assumed in the absence of reliable gaugings of daily flow at Sivasamudram that the flow at the Bhavani bridge is the same as that at Sivasamudram.

9. In order that Mysore reservoir should not detrimentally affect the existing British systems, it is necessary in my opinion to lay down some such rules as the following tentatively put forward:—

(i) That the water entering the reservoir should be gauged daily at some gauging station a short distance above the waterspread of the reservoir giving a measure of the flow into the reservoir.

(ii) That the flow of Cauvery at Sivasamudram shall be the measure of water-supply and that water entering the reservoir as gauged at the inflow gauging station shall be passed out into the river below the dam for British irrigation through sluices provided for the purpose in the following quantities:—

(1) When the Cauvery flow at Sivasamudram is under 2,300 m.c.ft. per day (26,680 cusecs) in the months of June, July, 2nd half of November, all December, January and February.	The whole inflow.

(2) When in the above months the flow exceeds 26,680 cusecs at Sivasamudram.	Whatever part of the inflow is required to maintain 26,680 cusecs.
(3) When the Cauvery flow at Sivasamudram is less than 2,530 m. c. ft. daily (29,340 cusecs) in the months of August, September, October and 1st half of November.	The whole inflow.
(4) When in the above months the flow at Sivasamudram exceeds 29,340 cusecs.	Whatever part of the inflow is required to maintain 29,340 cusecs.

During months of March, April and May—*Nil.*

10. The above suggestions are put forward as the absolute minimum which will safeguard existing British direct flow irrigation under existing conditions.

11. Trial tables for a reservoir such as is suggested are being worked out on the above rules taking flow at Bhavani bridge as the same as that at Sivasamudram and assuming that the excess flow available can always be impounded in the Mysore reservoir.

The gaugings available do not record flow at Bhavani bridge when less than 1,125 cusecs and the following allowances for days of unrecorded discharge in the months of March, April and May are allowed as available for impounding in the Mysore reservoir:—

March and April--30 m.c.ft. per day.
May—50 m.c.ft. per day.

12. If the Mysore reservoir should be constructed, at any time when the reservoir is empty or nearly empty and the demand for water great, the temptation to evade the rules would be so great as to be overpowering, and it is recommended that the Madras Government should only give consent to a scheme which, it can be shown to their satisfaction, will never fail even in the worst years of which there is any record.

It is in the bad years and only in such years that such a scheme as is proposed should affect British irrigation and it is just in these years that any reduction in water-supply has the most far-reaching effects.

A power scheme such as is projected is one *which must never fail* and it is only by fulfilling such conditions that the Mysore scheme can be successful. Unless Mysore can show that their project under the conditions of impounding imposed by Madras cannot fail, the inference is that such conditions will not be rigidly adhered to.

In the record of 20 years, 1890 to 1909-1910, the half-monthly flow June to January at Bhavani bridge is greater than that at Aganda Cauvery (Upper Anicut) as below:—

1st half June	Never.
2nd „ June	Never.
1st „ July	2 times.
2nd „ July	1 time.
1st „ August	3 times.
2nd „ August	5 times.
1st „ September	4 times.
2nd „ September	6 times.
1st „ October	2 times.
2nd „ October	2 times.
1st „ November	6 times.
2nd „ November	1 time.
1st „ December	1 time.
2nd „ December	1 time.
1st „ January	1 time.
2nd „ January	2 times.

The following statement shows by half-monthly periods from 1890 to 1909 (50 years) the discharges of the Cauvery above the Upper Anicut (in the first column) and at Bhavani bridge (in the second column) for those half-months in which the latter is greater than the former:—

Periods.	Discharges.	Year.
2nd half September 1892	16,833– 18,242	1892-93
1st „ November 1892	8,398—9,379	
2nd „ January 1893	774—1,517	
1st „ July 1894	8,869—10,000	1894-95
1st „ November 1894	17,790—18,553	
1st „ November 1896	6,324—7,932	1896-97
2nd „ July 1897	49,714—50,586	1897-98
2nd „ October 1897	36,348—38,809	
1st „ November 1897	11,412—12,571	
1st „ August 1898	44.142—46.046	1898-99
1st „ August 1898	15,876—16,850	
2nd „ August 1899	10,588—11,368	1899 00
1st „ September 1899	19,576—20,260	
2nd „ August 1900	91,090—97,621	1900-01
1st „ September 1900	31,229—31,451	
2nd „ September 1900	22,236—26,802	
1st „ October 1900	17,927—19,617	
2nd „ August 1902	10,873—11,898	1902-03
1st „ July 1904	94,437 1,00,513	1904-05
2nd „ August 1904	24,155—27,572	
1st „ September 1904	5,940—9,202	
2nd „ September 1904	14,821—21,731	
1st „ October 1904	6,674—9,672	
2nd „ October 1904	14,102—15,181	
1st „ November 1904	5,002—5,104	
2nd „ November 1904	1,424—2,369	
1st „ December 1904	322—14,787	
2nd „ December 1904	282—1,974	
1st „ August 1905	23,932—24,860	1905-06
2nd „ August 1905	14,509—17,493	
1st „ September 1905	21,508—23,137	
2nd „ September 1905	10,600—11,657	
2nd „ September 1906	16,107—18,660	1906-07
1st „ November 1906	7,693—14,217	
1st , August 1907	1,18,149—1,20,371	1907-08
2nd „ September 1907	5,964—6,121	1908-09
1st „ January 1910	700—1,883	1909-10
2nd „ January 1910	260—1,757	

STATEMENT of duties, Mysore Reservoir Project, as deduced from the Mysore Chief Engineer's statement, in millions cubic feet.

NOTE.—The italic figures denote pound water useful for British irrigation.

Month	For irrigation	For power	For evaporation	Total half-monthly	Draw-off half-monthly affecting British irrigation
June	580	*1,677*	75	2,322	655
	580	*1,677*	75	2,322	655
July	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
August	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
September	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
October	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
November	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
December	2,650	*1,677*	120	4,447	2,770
	2,650	*1,677*	120	4,447	2,770
January	580	*1,677*	75	2,332	655
	580	*1,677*	75	2,332	655
February	580	*1,677*	75	2,332	655
	580	*1,677*	75	2,332	655
March	580	1,677	75	2,332	2,332
	580	1,677	75	2,332	2,332
April	580	1,677	75	2,332	2,332
	580	1,677	75	2,332	2,332
May	580	1,677	75	2,332	2,332
	580	1,677	75	2,332	2,332
Totals ...	38,760	*40,248* *10,062*	2,340	81,348	51,162

* Total of irrigation months, 329, 269—337, 267.

No. 3-D.—Explanatory note and rules for preparing working tables by the Special Superintending Engineer, dated 17th November 1910.

In my note, dated 15th November 1910, paragraph 9, tentative conditions regarding the limitations under which Mysore could impound were put forward and tables have been prepared based on these conditions.

It is assumed for the purpose of the tables that there is no diminution of flow between Sivasamudram and Bhavani bridge, that is, that the inflow will not be less than the draw-off and loss by percolation and evaporation between these points.

The daily flow at Sivasamudram is not available for comparison. If it is found that in a bad year the flow at Sivasamudram is greater than that at Bhavani bridge, an increased flow to that extent must be passed by Mysore before any impounding is allowable, as it is the flow at Bhavani bridge that is the measure of the British irrigation requirements.

2. The daily flow at Bhavani bridge from daily gauge reading for 20 years has been worked out and discharge tables and gauge readings for the period are appended to the working tables.

It has to be explained that the zero of gauge at Bhavani bridge has been set too high that it does not record flow below 1,125 cusecs.

For these tables the assumption has been made that, on a day when no reading on the gauge is recorded, the flow has been in March and April of 30 m.c.ft. and for May of 50 m.c.ft. daily.

In these months the whole flow is taken as available for impounding in Mysore reservoir.

3. The draw-off from Mysore reservoir for power and for irrigation and the evaporation and percolation losses are taken from the table supplied by the Chief Engineer, Mysore, with his note dated 15th October 1910. The quantities of the draw-off for irrigation are four times those in column 6 of this table.

No allowance is made for water draining off new irrigation returned to the river.

It is not considered that such returns in appreciable quantities can be counted on with any confidence; indeed, as there are numerous tanks below the canal line in the area to be irrigated, it is probable that any surplus water will be impounded in these and not allowed back to the river.

4. The draw-off for power is taken from the sum of columns 7 and 9 of the Mysore Chief Engineer's table.

For the months of June to February, inclusive, the flow returned to the river from the power station is usefully available for existing British irrigation and is not deducted in the draw-off column of my tables (column 3). After the end of February and up to the end of May, water is not required for irrigation and the full draw-off for power is shown in column 3 and the full flow of Cauvery is shown as impounded in Mysore Reservoir, column 2.

5. The rules for drawing up the tables are attached to these explanatory remarks.

RULES FOR DRAWING UP WORKING TABLES, MYSORE CAUVERY RESERVOIR PROJECT.

1. The maximum impounding allowable in the reservoir per half-month (column 2) is—

In the months of June, July, December, January, February and 16th to 30th November.	The sum of the excesses of daily discharge at Bhavani bridge over 2,300 m.c.ft.
In the months of August, September and 1st to 15th November.	The sum of the excess of daily discharge at Bhavani bridge over 2,530 m.c.ft. per day.
In March, April and May.	The total flow at Bhavani bridge.

2. Column 3 of table is from column 6 of Statement of Duties—Mysore Reservoir Project.

3. Column 4 of table is figures in column 2 less those in column 3 (+ or —) and column 5 is the algebraic sum of the figures in column 4 and the previous entry in column 5.

(Enclosure not printed.)

No. 4.—D. O. letter No. 1757—En. 1, dated Bangalore, 27th December 1910, from T. Ananda Rao, Esq., C.I.E., Dewan of Mysore, to the Hon'ble Colonel Hugh Daly, C.S.I., C.I.E., Resident in Mysore.

With reference to the correspondence ending with the Residency D. O. No. 7429, dated the 7th instant, regarding the proposed construction of a reservoir on the Cauvery river, the Durbar have examined the notes and statements kindly supplied by the Madras Government. The issues involved appear to be simple and, for reasons given below, the Durbar entertain the hope that the Madras Government will not further withhold their consent to the commencement of the construction of the reservoir dam.

2. The statements received from the Madras Government give the discharges which that Government would like to have, but not what they have actually used in past years. According to the terms of the understanding between the two Governments (*vide* Residency letter No. 1022 –346-90, dated the 26th March 1892), " the Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the existence, extent and nature of such right and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case."

3. From the printed Triennial Revenue Reports on irrigation works, it is noticed that the Madras Public Works Department have not used more than an average discharge of 11,060 c. ft. per second in any month during the irrigation season. The average for the three years ending 1907-08 was only 9,753 c. ft. per second. But according to the note received from them, the Madras Government are opposed to the Mysore Government storing any supply at Kannambadi whenever the river discharge falls below 26,680 c. ft. per second.

4. Again, during the three years ending 1907-08, it is seen that the following quantities surplused into the sea:—

Years	Total yield of the river	Quantity utilized in deltaic irrigation	Balance which ran to waste
	M. C. FT.	M. C. FT.	M. C. FT.
1905-06	325,434	189,792	135,642
1906-07	580,650	201,297	379,353
1907-08	463,070	238,014	225,056

According to the table hereto attached, which is based on figures accepted by the Chief Engineer for Irrigation, Madras, it will be seen that the storage required for the Mysore reservoir is only 51,162 m.c.ft. and that we only propose to impound a portion of the water that is now running to waste.

5. The Chief Engineer to the Madras Government refers in his note to a reservoir which it is proposed to construct in the Madras Presidency. If they construct one, it is obvious they would not allow a discharge of 7 feet of water for irrigation purposes, whenever available, at the Upper Anicut. If they did, the waste would be so great that not much water would be left to store. The Madras Public Works Department can scarcely desire to use the water for all time by methods which involve such excessive waste.

6. If it is considered necessary to pursue the subject further, the Madras Government may be requested to furnish details of the quantities available at the Upper Anicut and of those they have actually been using for irrigation purposes during the past ten years. They may be also requested to kindly furnish full particulars required for examining the case in the light of the quotation given in paragraph 2 above from rule 3 of the understanding of 1892.

7. The detailed scheme for the reservoir will probably be ready by the end of January or middle of February next. The discharges required for irrigation from the new reservoir are given in the accompanying statement. They will not be exceeded for the simple reason that the canal proposed will not be larger than what is necessary to discharge the quantities given in column 2 of the statement. From the months of January to May, more water will be going out of the reservoir for power generation than will be impounded from the stream.

8. The Durbar will be prepared to restrict the storage during periods in which the crops in the Madras Presidency are likely to suffer, provided they can fill the reservoir by end of October of each year.

9. The circumstances may be summarised as follows:—

The catchment area intercepted by our reservoir is only about one-seventh of the entire catchment above the Upper Anicut at the head of the delta.

Mysore requires a storage of about 51,000 m.c.ft.

At present, even during years of very short rainfall, probably about 135,000 m.c.ft. of river supply is not required for the Madras irrigation and is running to waste.

The Madras Government have been sending into the irrigated area below the Upper Anicut on an average less than 10,000 c. ft. per second. There is no evidence that even this was all being actually utilised.

The Madras Government want to restrict our storage when the discharge falls below 26,618 cusecs.

According to their own showing, even if this demand be conceded, the supply required for the reservoir will fall short only in three years out of 20.

10. The representative of Messrs. John Taylor & Sons, who is here, is anxious for an immediate assurance that the reservoir will be constructed and we are unable to come to any definite understanding with him, pending receipt of the consent of the Madras Government.

11. I am to express the hope that, for the reasons stated in paragraph 9 above, the Madras Government raise no objection to our commencing construction of the reservoir at once, leaving the details of regulation of water to be settled by mutual agreement. It seems quite possible for the engineer representatives of the two Governments to suggest a way by which Mysore will have the storage required without practically any interference with the supply hitherto used by Madras.

If an understanding is arrived at, we might begin work and the details might be threshed out by the engineers for the approval of the two Governments.

If this is not agreed to, the current working season is likely to be lost, and the Mining Companies will not receive the protection within three years as asked for.

28

STATEMENT showing quantities of water available in the river Cauvery as gauged at the Upper Anicut and quantities required for storage in Mysore.

(The figures given represent millions of cubic feet.)

	For irrigation	For power	For evaporation	Total half monthly	Draw-off half monthly affecting British irrigation	River supply during 1905-06, *i.e.*, the worst of three years ending 1907-08			Quantities required for storage in Mysore
						Total supply in river	Quantities utilized for irrigation in Madras	Balance available and which runs to waste	
1	2	3	4	5	6	7	8	9	10
June	580	1,677	75	2,332	655	*13,354*	*13,328*	*26*	
	580	1,677	75	2,332	655				
July	2,650	1,677	120	4,447	2,770	*116,455*	*49,593*	*66,862*	
	2,650	1,677	120	4,447	2,770				*51,162 vide* column 6.
August	2,650	1,677	120	4,447	2,770	*40,716*	*38,780*	*1,936*	
	2,650	1,677	120	4,447	2,770				
September	2,650	1,677	120	4,447	2,770	*46,367*	*39,569*	*6,798*	
	2,650	1,677	120	4,447	2,770				
October	2,650	1,677	120	4,447	2,770	*76,729*	*24,608*	*52,121*	
	2,650	1,677	120	4,441	2,770				
November	2,650	1,677	120	4,447	2,770	*10,069*	*10,069*	...	...
	2,650	1,677	120	4,447	2,770				
December	2,650	1,677	120	4,447	2,770	*6,685*	*6,685*	...	...
	2,650	1,677	75	2,332	655				
January	2,650	1,677	75	2,332	655	*3,003*	*3,003*	...	...
	580	1,677	75	2,332	655				
February	580	1,677	75	2,332	655	*1,531*	*1,403*	*128*	...
	580	1,677	75	2,332	655				
March	580	1,677	75	2,332	655	*524*	*168*	*356*	...
	580	1,677	75	2,332	655				
April	580	1,677	75	2,332	655	*523*	*422*	*101*	...
	580	1,677	75	2,332	655				
May	580	1,677	75	2,332	655	*9,478*	*2,164*	*7,314*	...
Total ...	38,760	40,248	2,340	81,348	51,162	*325,434*	*189,792*	*135,642*	*51,162*
		10,062							

NOTE.—Figures in Roman are taken from the statement which accompanied the note by the Chief Engineer for Irrigation, Madras.

Figures in *italics* are taken from the Triennial Revenue reports for the period ending 1907-08, Public Works Department, Irrigation Branch, Madras.

No. 5.—Letter No. Camp (Virajpet) 19, dated 19th January 1911, from the First Assistant Resident, to the Dewan of Mysore.

With reference to your D. O letter No. 1757, dated the 27th December 1910, regarding the proposed construction by the Durbar of a reservoir on the Cauvery, I am desired to forward herewith, for the information of the Durbar, a copy of a D. O. letter No. R. O. C. 386-I—10-2, dated the 10th January 1911, from the Joint Secretary to the Government of Madras, Public Works Department, together with a copy of the note by the Chief Engineer for Irrigation, Madras, therein referred to.

No. 5 A.—D. O. Letter R. O. C. No. 386-I—10-2, dated Madras, 10th January 1911, from the Hon'ble Mr. H. E. Clerk, Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch, to the Hon'ble the Resident in Mysore.

I am directed to acknowledge the receipt of your D. O. letter of the 27th December 1910, enclosing one from the Dewan of Mysore, regarding the proposed construction of a reservoir on the Cauvery river.

2. In order to meet as far as possible the Dewan's request that a very early reply should be given to his letter, the figures therein asked for have not been furnished. I am directed, however, to enclose a note by the Chief Engineer for Irrigation from which it will be seen that the figures given in the Dewan's letter are not altogether correct and that any attempt to deduce the requirements of the Cauvery delta system from an average duty throughout the cultivation season would lead to entirely erroneous results.

3. The reading of 7 feet on the Cauvery Dam gauge has for many years past been recognised as indicating the amount necessary to give full supply to the delta. This high gauge is necessary on account of the intermittent nature of the supply and although it is not always possible to maintain that level, this Government are of opinion that it cannot be deliberately reduced without affecting the existing interests in the Tanjore delta. Were a constant supply guaranteed, it might be possible to reduce this level; but, in the absence of any such assurance and of any more convincing arguments than those now put forward, I am to say that the Madras Government regret their inability to modify the terms on which they would be prepared to allow the work to proceed as set forth in D. O. letter No. R. O. C. 386-I—10 of the 6th December 1910.

4. In the latter part of his letter, the Dewan of Mysore who doubtless recognises the difficulty of reconciling the proposals made by the Mysore Engineers with the interests of existing cultivation in Madras, suggests that permission should be given to start the work of the reservoir in Mysore, and to leave the details of its regulation to some future date. With regard to this proposal, I am directed to invite the Dewan's attention to the conditions already laid down by the Government under which alone the construction of a reservoir on the Cauvery could be approved, and to state that, as no details of the design of the reservoir, or of the way in which it is to be worked, have been received, His Excellency the Governor in Council cannot accede to the request.

5. I am further to state that this Government would have great pleasure in facilitating the accomplishment of any project which the Mysore Durbar may put forward, provided that it can be clearly shown that it will not be detrimental to those vested interests in Madras which it is the duty of this Government to safeguard.

No. 5-B.—Note by the Chief Engineer for Irrigation.

The Resident in Mysore in his D. O. letter, dated 27th December 1910, encloses a letter from the Dewan of Mysore regarding Mysore Cauvery Reservoir which contains certain figures from which it is argued that the quantities of water said by this Government to be necessary for existing irrigation in Tanjore are excessive. The suggestion is also made that the Madras Government should at once accord approval to the commencement of the reservoir leaving the details of regulation to be settled by mutual agreement hereafter.

2. With regard to the first point, it is submitted that the figures given in the Triennial Report on which the Dewan's arguments are based, are not to be depended on, although they were the most accurate available at the time of compilation of the report. This fact was brought to the notice of the Chief Engineer of Mysore when the report was given to him. It is not clear whence the figure 11,060 cusecs is derived; it is, however, evidently an average discharge for the year or nine months' cultivation season. With regard to this it is sufficient to observe that, in the consideration of a system depending on direct flow from a river, the question of average discharge is unimportant. What is required is the discharge during the period of maximum demand.

3. The figures of the Triennial Revenue Report being so incorrect, it is impossible to base any argument on them. It need only be pointed out that the monthly discharges are far in excess of those stated by the Dewan.

4. Again, in paragraph 4 of his letter, the Dewan of Mysore quotes surpluses at the Upper and Grand Anicuts as running to waste into the sea. This is by no means necessarily the case. The water which runs to waste into the sea is that which passes the Lower Anicut, figures for which are given in the diagram to face page 76 of the Triennial Report. These annual surpluses are sometimes greater and sometimes less than those at the Upper and Grand Anicuts. When they are greater, they are generally due to heavy local rain late in the year. The surplus available during the months of June, July, August and September are not so great as to admit of the abstraction of a large quantity of water without interfering with the supplies required for existing cultivation. There appears, therefore, nothing in the figures set forth by the Dewan of Mysore to prove that the requirements of existing irrigation as defined by this Government are excessive.

5. With regard to the request that permission should be granted to go on with the work and settle conditions of regulation afterwards, it will be noticed that the Mysore Government have in no way modified their original scheme, nor have they made any suggestion for working it so as to meet the requirements of Madras. In such circumstances the Chief Engineer for Irrigation can only recommend that the request should not be complied with.

No. 6.—D. O. letter No. 1875, dated Bangalore, 5th February 1911, from T. Ananda Rao, Esq., C.I.E., Dewan of Mysore, to the Hon'ble Colonel Hugh Daly, C.I.E., Resident in Mysore.

I write to acknowledge with thanks the receipt of Mr. Warburton's letter enclosing the reply of the Joint Secretary to the Government of Madras to my letter dated the 27th December last, on the subject of the Mysore Cauvery Reservoir.

2. The questions involved are of very great importance, but their solution does not appear to be beset with any insuperable difficulties.

The facts seem simple enough. The total discharge at the head of the Cauvery delta is usually over 450,000 m.c.ft. The quantity actually utilised in the past for delta irrigation does not seem to exceed 200,000 m. c. ft., or less than one-half on an average. When the distribution of the water is properly regulated, it will be even less.

The Mysore reservoir will store about 42,000 m.c.ft. or less than one-tenth of the total supply. The quantity which may be utilized in Mysore may be about one-tenth, but will not exceed one-eighth.

The margin left which goes to waste is so large that it should not be difficult for engineers to devise a means for abstracting 40,000 or 50,000 m.c.ft. within Mysore territory without interfering with the existing demand on the delta.

3. The Joint Secretary's letter states that the figures on which my statements are based are erroneous, but every figure has been taken from the printed reports of the Madras Government. If they are wrong, it is very important that we should be furnished with correct figures.

In paragraph 6 of my letter, dated the 27th December last, I stated that the figures showing the supply actually used in the delta from year to year were urgently required. I understand the information will also be available in the shape of diagrams. The Durbar will be highly obliged if this information is furnished at once. The letter from the Joint Secretary states that the information was not supplied for want of time, but he does not say when he will favour us with the figures which are indispensable for a practical solution of the question at issue.

4. In a memorandum which accompanied his letter to the Residency, No. 1-A, dated the 10th June 1890, my predecessor, the late Sir K. Sheshadri Iyer, pointed out that the obligations of the two Governments in the matter of utilizing the surplus waters were reciprocal.

"It may be," said he, "that owing to causes beyond control the Mysore Government have not hitherto been able to exercise their rights to the fullest possible extent, ... but this, I submit, cannot have the effect of destroying the natural rights of the State to a beneficial enjoyment in its water. It is also important to remember that it has not yet been shown that any of our proposed works is likely to materially diminish the water-supply to the Madras Presidency . . . . If indeed no work calculated to intercept any portion of the water of the Mysore rivers is, hereafter, to be undertaken by Mysore without the consent of Madras, then it is only fair that the obligation should be reciprocal. At any rate Mysore should have due notice, from time to time, of the creation of new works and enlargement of old works in Madras, in respect of which a right by way of prescription would be claimed at some further time."

His Highness' Government will be glad if you will kindly invite the attention of the Madras Government to the obligation which exists on their side also in this respect.

The natural rights referred to in the above quotation have been exercised by the Mysore State from time immemorial in the manner correctly and graphically described in the chapter on Public Works in the Mysore Administration Report for the year 1872-73 during the days of Mysore Commission. Those rights the Mysore Durbar have exercised not only since the Rendition, but also in the days of the British Commission.

5. This Government have already furnished all the information reasonably required by the Madras Government regarding the Mysore Cauvery Reservoir Project.

6. The Madras Government have given us to understand that similar reservoir projects across the Cauvery in the Madras Presidency have been prepared and the latest one has been submitted to the Government of India. In those projects the Madras Government will have discussed the question of the available supplies and the methods of their distribution, and the discussions cannot fail to be of value in the settlement of this case.

7. When the Chief Engineer of this State went to Madras in November last at a suggestion of the Madras Government for the purpose of arriving at a settlement of the engineering difficulties, he asked to be permitted to see the Madras Cauvery Projects. Although the officers were very courteous to him, they expressed their regret that they could not show him the Madras project. And this notwithstanding that the Madras Government had previously suggested that the Engineers of the two Governments should personally "discuss the details of both projects" (*vide* Madras Government demi-official letter to the Residency, dated the 12th November 1910). Also, in a demi-official letter to the Chief Engineer of this State, the Hon'ble Mr. C. A. Smith, then Secretary for Irrigation to the Madras Government, had written as follows:—

"The Madras Government Cauvery Project is completely worked out and will by that time (*i.e.*, 17th November 1910) be ready for submission to the Government of India and I shall be glad to give you details."

It was probably owing to the Hon'ble Mr. Smith's absence from duty through indisposition that the Madras project was not made available.

Unless the Madras engineers are prepared to place all necessary information unreservedly at our disposal and indicate in what directions their own inclinations run, this Government fear there will be no progress with these negotiations.

8. Our engineers feel certain that an immediate solution of the question is possible if only all the necessary facts and figures are examined and discussed in an amicable spirit. If desired, the papers and information supplied by the Madras Government will be treated as confidential.

9. As you are aware, the matter is very urgent and His Highness' Government will be greatly obliged if you will kindly move the Madras Government to change their attitude and make all reasonable efforts to meet us, so that an understanding may be reached without further loss of time.

No. 7.—D. O. letter No. 1523—Enc. 1, dated Bangalore, 10th March 1911, from the First Assistant Resident, to the Dewan of Mysore.

With reference to your demi-official letters No. 1875, dated the 5th February 1911, and No. 1983, dated the 3rd March 1911, regarding the proposed construction by the Durbar of a reservoir on the Cauvery, I am desired to forward herewith for the information of the Durbar a copy of a demi-official* letter from the Acting Joint Secretary to the Government of Madras, Public Works (Irrigation) Department, on the subject.

*R. O. C. No. 167-I—11-I, DATED 6TH MARCH 1911.

No. 7-A.—D. O. letter R. O. C. No. 167-I—11-I, dated 6th March 1911, from the Acting Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch, to the Hon'ble the Resident in Mysore.

I am directed to acknowledge the receipt of your D. O. No. 725, dated 8th February 1911, enclosing a letter from the Dewan of Mysore. With regard to the first 5 paragraphs thereof, I am directed to state that this Government regret that they are unable to give any further reply than that already given in my R. O. C. No. 386-I—10-2, dated 10th January 1911, except to point out again that tables showing the amount of water available for storage in the reservoir proposed in Mysore have already been furnished with my letter R. O. C. No. 386-I—10, dated 6th December 1910. With regard to the Dewan's request to be supplied with a copy of the report on the British Cauvery Reservoir Project, I am to say that, by a standing order of the Government of India, this Government are unable to forward the report to the Durbar without the sanction of the Government of India who have been requested to accord such sanction. This Government hope that there may be no long delay in the Durbar's request being complied with.

(ii)

Letter No. 1315—I. B, dated Simla, the 27th June 1911, from L. W. Reynolds, Esq., Deputy Secretary to the Government of India, Foreign Department, to the Hon'ble Lt.-Col. H. Daly, C.S.I., C.I.E., Resident in Mysore.

With reference to your letter No. 2053—E. I., dated the 3rd April 1911, regarding the proposal of the Mysore Durbar to construct a reservoir on the Cauvery river within the limits of the Mysore State, I am directed to forward, for the consideration of the Mysore Government, a copy of a note, dated the 12th May 1911, written by the Inspector-General of Irrigation, and to say that there appears to be no necessity to depute an officer to investigate the claim of the Durbar to the use of the waters of the Cauvery, as the full data which are necessary for the consideration of the question have been collected in the course of the preparation of the Madras reservoir project, and are already in the possession of the Government of India.

2. The Government of India regret that, as at present advised, they are unable to accord their sanction to the immediate construction of the reservoir in accordance with the wishes of the Mysore Durbar, for it appears to them to be open to serious objection on the ground that, if it were constructed to the design sketched out by the Durbar, it would seriously interfere with the existing irrigation of the Madras cultivators.

If, however, the Mysore reservoir were constructed of the capacity suggested in Sir John Benton's note, the supply of the water stored in it would be sufficient for the requirements of the power and irrigation scheme contemplated by the Durbar.

3. I am to ask that, if you see no objection, you will advise the Durbar to amend the complete project in accordance with Sir John Benton's suggestions. If the Durbar concur in this proposal, as the Government of India trust will be the case, I am to ask that the amended project may be discussed with the Government of Madras and the results of the discussion reported for the orders of the Government of India.

SUB-ENCLOSURES.

Note on the proposal of the Mysore Durbar to construct a storage reservoir on the Cauvery River in Mysore territory by Sir John Benton, K.C.I.E., Inspector-General of irrigation, dated 12th May 1911.

I.—ADMINISTRATIVE.

Brief statement of case.—In 1892 an agreement was concluded between the Madras Government and the Mysore Durbar regarding the limitations for construction of works in the latter State on rivers which enter the Madras Presidency. The Cauvery is the most important of all these rivers. The Mysore State works on the Cauvery river comprise,—the hydro-electric works at Sivasamudram for the supply of power to the Kolar Gold Fields,—and works which irrigate about 108,000 acres of land. The Madras Government works on the Cauvery comprise those for a very old system of irrigation which water about 1,100,000 acres annually.

Internal B., April 1892, Nos. 376-378.

2. The Mysore Durbar propose to construct a reservoir of a present capacity of 11,000 and ultimate capacity of 41,500 million cubic feet on the Cauvery river, the objects in view being as follows:—

(i) To maintain an unfailing supply of water to the power station at Sivasamudram in connection with the present supply of power to the Kolar Gold Fields.

(ii) To generate additional electric power for mining and other industrial purposes on a large scale.

(iii) To provide water for irrigating an extensive tract of country more or less liable to drought.

It is part of the Agreement of 1892, referred to above, that the proposals for any such new works should be referred to the Madras Government, and this condition was complied with in this case.

3. On examining the preliminary proposals of the Mysore Government—as intimated in some unofficial correspondence, and as verbally explained by the Chief Engineer, Mysore State—the Madras Government found that the execution of the proposed works would seriously interfere with the irrigation on existing works in Madras Presidency which have a prescriptive right to the water under the terms of the Agreement of 1892. Consent to the scheme as sketched in the proceedings above mentioned was therefore withheld. The effect of operating the proposed Mysore reservoir on the following conditions was investigated:—

(i) The Madras irrigation works to continue to have the supply they now draw off, that is, up to 7 feet gauge readings on the Cauvery Dam, with 10 per cent extra in certain months as proposed by the Madras Government.

(ii) The Mysore reservoir to impound water in excess of (i) above.

The result was found to be that the power scheme would fail in three years out of 20. The Mysore Durbar were asked to devise a scheme which would not prejudice existing prescriptive rights in Madras. The fully detailed project, with a copy of the rules for operating the same, was called for.

4. *Agreement of 1892.*—A copy of this Agreement is the concluding annexure to the Madras Government's letter * No. 428-I., dated 23rd December 1910; the portions of the same which apply to the case under consideration are as follows:—

* General No. 7190-I. of 1910.

(i) In these rules "(1) 'New Irrigation Reservoirs' shall mean and include such Irrigation Reservoirs or tanks as have not before existed, or having once existed have been abandoned and been in disuse for more than 30 years."

(ii) "The Mysore Government shall not, without the previous consent of the Madras Government or before a decision under Rule IV below, build (*a*) any 'New Irrigation Reservoir' across any part of the fifteen main rivers named in the appended Schedule A or across the following streams of Schedule A lower than the points specified hereunder.

Across (No.) 10 the Cauvery—lower than the Ramaswami anicut."

(iii) "When the Mysore Government desires to construct any 'New Irrigation Reservoir,' or any new anicut requiring the previous consent of the Madras

Government under the last preceding rule, then full information regarding the proposed work shall be forwarded to the Madras Government and the consent of that Government shall be obtained previous to the actual commencement of work. The Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the existence, extent and nature of such right and the mode of exercising it being in every case determined in accordance with the law on the subject of prescriptive right to the use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case."

(iv) "Should there arise a difference of opinion between the Madras and Mysore Governments in any case in which the consent of the former is applied for under the last preceding rule, the same shall be referred to the final decision either of Arbitrators appointed by both Governments, or of the Government of India."

SCHEDULE A.

Main rivers.	*Remarks.*
10. Cauvery.	

5. With reference to the above extracts I may explain as follows :—

(*a*) The site of the proposed Mysore new reservoir is at Kannambadi below Ramaswami Anicut, so that the foregoing rules apply.

(*b*) The full information regarding the design of the proposed Mysore masonry dam sluices, and irrigation scheme, and the rules for operating the same have not been furnished to the Government of Madras up to now, as far as known to the Government of India.

The Madras and Mysore Governments both base their respective cases on the extracts from the Rules of 1892 given in the preceding paragraph, so that the case resolves itself into one of applying the conditions of the concluding sentence of Rule III.

6. *Action of Madras Government.*—The Government of Madras reported on the proposal to construct a reservoir in Mysore territory in their letter No. 428—I., * dated 23rd December 1910, and in their letter No. 78—I., † dated 8th March 1911, they applied for permission to supply the Mysore Durbar with a copy of the Madras Cauvery Project of 1910, which was granted by Government of India. I will explain in the sequel that the proposed Madras Cauvery Project will not affect the Mysore scheme, while it is a most useful source of information regarding the available water-supply. The Mysore Durbar was furnished with full particulars by the Madras Government with regard to the surplus supplies of water available and it was clearly shown that the proposed Mysore reservoir is too small, and will fail in 3 years out of 20.

* General No. 7190—I of 1910.

† General No. 1610—I.

7. *Action of Mysore State.*—The Resident in Mysore forwarded with his letter No. 2053—E.I., dated 3rd April 1911, a copy of a letter No. 869, Political, dated 27th March 1911, from the Dewan of Mysore, in which the views of the Durbar are fully expressed. It is only fair to the Dewan to state that, when he wrote his letter, he had not the advantage of having seen the data furnished in the Madras Cauvery Project, nor of being in possession of the statistical information which I am now to advance. Most of the subjects dealt with in the Dewan's letter require explanations of existing conditions, and I will reserve his letter for consideration after I have described the Cauvery river as it actually exists.

8. *Proposal to depute officers to report on the case.*—This proposal has been advanced both by the Dewan of Mysore, and by the Resident ; but neither of these was aware that most careful detailed enquiries regarding the water-supply of the Cauvery river formed the subject of investigation by the Madras Irrigation officers for over a year before the Madras Storage Irrigation Project was submitted to the Government of India, and that full information has been furnished in the three printed volumes relating to that scheme. The information regarding water-supply

conditions collected in connection with the Madras Cauvery Project of 1910 is precisely what is required for the Mysore Reservoir Project; it was collected by the Madras Irrigation officers with the sole object in view of arriving at the actual facts of the case, so that they might be able to advance a perfectly reliable project, and at a time when the project for the Mysore Reservoir was supposed to be abandoned; these circumstances coupled with the fact that all the data had been printed before the resuscitation of the Mysore Reservoir Project in 1909 was first known of to the Madras officers will, I trust, serve to show that the data given in the Madras Cauvery Project of 1910 may be accepted with confidence as a perfectly unprejudiced representation of the conditions regarding water-supply, when there is no Mysore reservoir to intercept supply. In my opinion there is nothing for officers to be deputed to enquire into, the requisite data being all already on record.

9. *Margin of safety.*—The circumstances connected with the preparation of the Madras Cauvery Project—when it was assumed that no Mysore reservoir would exist—promises a better chance of supply not failing than will exist when the Mysore work is executed; it therefore appears necessary to have some margin of safety in accepting the figures of the Madras project as far as they relate to existing irrigation in that presidency. I will return to this question in the sequel.

10. *Existing irrigation in the Cauvery delta.*—In what follows this is all that is considered,—possible expansion not being dealt with,—since the terms of the Agreement of 1892—*vide* paragraph 4 above—do not apply to irrigation which does not exist at present.

11. *Character of the Cauvery river.*—The river drains mountainous tracts—those on the west having a heavy rainfall of over 96 inches; the declivity of the channel is steep, and the floods frequent, rapid and torrential. The rise and fall of the river at the head of the Madras Delta corresponds to every important shower in the catchment area. In Appendix I to this note I have given the dates of occurrence of the various floods which have occurred in the twenty years ending with 1909-10. It will be seen that the floods and freshets have been very numerous. The diagrams of the gauge readings are far more serrated than those on almost any other large river in India.

12. *Unsteadiness of supply.*—This has a very important effect on the duty, and on the amount of water required for the Madras Delta. Appendix II to this note has been prepared to show how the supply has varied in the Cauvery over the dam Upper Anicut,—which affects most of the irrigation,—and also in the Coleroon which carries off the surplus water. The same month for each year has been given on the same statements for the twenty years ending 1909-10, and the particulars have been given for half-monthly periods. This Appendix has been prepared from Volume III, Parts VI and VII of the Madras Cauvery Project, and it shows as follows:—

Columns 3 and 4.—That unsteadiness of supply in the river characterises the flow throughout the irrigating season 1st June to 31st October. The available supply varies from one-fifth of irrigation full supply to about ten times this amount.

Column 5.—That the average "Irrigation supply" varies incessantly with the flow in the river,—and I may explain to an extent which is unknown,—as far as I am aware,—on large canal systems elsewhere in India.

Column 6.—That the steady average supplies which would suffice for the area to be irrigated—if a reservoir is provided—are very much less than those which have to be run in order to take advantage of freshets and floods.

Columns 7 to 9.—That the Coleroon river which acts as an escape for carrying off excess supplies is most erratic in its running,—as might be expected under the working conditions which are as follows:—

(*a*) Main supply of the river that due to floods.
(*b*) Supply up to 7 feet on the gauge on the Cauvery Dam passed down the Cauvery for irrigation.
(*c*) Excess over 7 feet on gauge passed into the Coleroon river which goes waste to the ocean—except for the small part drawn off at the Lower Anicut further down the river.

The abovementioned conditions of working show that, in the absence of great storage works to conserve flood waters, the surpluses in the Coleroon cannot be turned to any useful account. Surplusing at the proposed Mysore reservoir and into the Coleroon would usually occur simultaneously for the same floods, and the surplus waters may be ignored.

13. The conclusions which may be drawn from Appendix II are as follows:—

(i) In order to take advantage of flood waters, the cultivators must take as much water as they can procure when it is available, since the date of occurrences of the next flood and full supply is uncertain, while the rice crop is not one which will outlive drying up.

(ii) The necessity just mentioned makes it quite impossible to practise the economy in the amount of water used which is possible with an assured supply, since any real attempt to do so would inevitably result in the rice crop being damaged.

14. *Rainfall.*—It might be thought that the rainfall is of sufficient amount to admit of some curtailment of supply without serious detriment to the rice crop. The Madras Delta is in Tanjore district, and Appendix III to this note which gives the average rainfall for 23 observation stations for the twenty years ending with 1909-10 shows as follows:—

(i) That the annual and monthly rainfall varies greatly, and is liable to wide departures from the average.

(ii) That comparison of the entries under the same month for different years will show that no cultivator would be justified in calculating on the rainfall likely to be received.

(iii) That the rainfall is not such as to afford any means of departing from the practices—paragraph 13 (i) and (ii) above.

15. With a storage reservoir of great capacity the river freshets and floods could be stored, and fairly full advantage could be taken of the generally good but often capricious rainfall; however, the case under cosideration is that of using the ever varying river supply as it comes, or allowing it to go waste to the ocean.

16. *Other causes contributing to a low duty for the water.*—In paragraphs 11—15 above, I have explained the principal obstacles to obtaining a high duty for the water; the following additional causes also have effect:—

(i) Some of the distributaries are large and have wide sandy beds—where there is some undesirable loss of water.

(ii) The distributary system is an inheritance from the past, and is not very efficient: some of the channels have been in use for hundreds of years. Vested rights are substantial, and irrevocable; to embark on any great measure of modernising would result in untold troubles. The source of supply is a flood-ridden river, and for it the large flood-swept distributaries have great advantages.

17. *Special difficulties in abstracting more water from the Cauvery.*—Appendix IV affords a comparison between the Cauvery irrigation and that of the other two great deltaic irrigation systems in Madras. The figures have been taken from the Triennial Irrigation Reports with the exception of (*c*) and (*e*) for the Cauvery for which I have adopted the more accurate figures given in the Madras Cauvery Project. This Appendix and Appendix VI show as follows:—

Particulars	Godavari	Kistna	Cauvery
Rainfall—Inches	25 to 58	25 to 57	18 to 57
River supply—M. C. Feet	1,877,000 to 5,812,000	1,041,000 to 2,803,000	203,744 Appendix VI to 700,564
Supply utilized ,, ...	140,000 to 176,000	93,000 to 121,000	186,000 to 407,000
Percentage of river supply utilised—M. C. Feet.	3 per cent to 9 per cent	4 per cent to 9 per cent	40 per cent to 86 per cent
Irrigation—Acres	912,000	685,000	1,105,000
Supply of water per acre of irrigation, c. ft.	154,000 to 202,000	140,000 to 187,000	175,000 to 269,000

The Cauvery carries from one-fifth to one-eighth the discharge of the other two rivers, but the percentage of the river supply which is utilised is from 40 per cent to 86 per cent,—as compared with a maximum of 9 per cent on the others. The amount of water required per acre on the Cauvery is from 14 per cent to 100 per cent in excess of that on the other two rivers. The large percentage of the Cauvery now utilized greatly adds to the difficulties of meeting proposed expansions—more especially as it is only certain proportions of floods which can be utilised. The comparatively large supplies per acre irrigated result from the conditions of fluctuating supply explained in paragraph 11 to 13 above, and which are unavoidable in the absence of great storage works such as proposed for the Madras Cauvery Project. Entire reliance cannot well be placed on the discharge figures of the Triennial Revenue Reports, but none of the inaccuracies in these are likely to call for any modification of the main conclusions advanced above.

18. *Supplies used in the last 20 years according to Revenue Reports.*—The Administration Reports, Irrigation Works, Madras, furnish some particulars regarding the supplies of water used in past years. I have abstracted such information as is procurable from these reports in Appendix V to this note. The Madras Irrigation officers repeatedly stated in the Triennial Revenue Reports,—that special observations were required to obtain correct discharges,—that a special establishment was required for this purpose,—and that they did not rely on the results which I have given in Appendix V—as accurate enough. The manifest discrepancies exhibited by the results in Appendix V bear out the suspicions of the Irrigation officers. I have given the results afforded by the past Revenue Reports in order to put forward all the information which is available; but I regret to be under the necessity of agreeing with the Irrigation officers that reliance cannot be put on the figures; however, I will show below that it is unnecessary to be guided by these figures.

19. *Supplies of water used in Cauvery Delta.*—This question has been specially investigated in the Madras Cauvery Project, and Appendix VI to this note is an abstract of the principal results. As explained in Volume III of the Madras Cauvery Project, an elaborate series of observations were made. The statement, pages 208 to 212, gives the result and Appendix VI has been abstracted from the same.

Column No. 2—Shows the supplies passed over the Cauvery Dam into the tract to be irrigated.

Column No. 3—Shows the amount surplused in the Coleroon river; except for the supply for about 110,000 acres of irrigation on the Lower Anicut, the water is surplused into the ocean.

Column No. 4—This is the total supply reaching the Upper Anicut.

Column No. 5—This shows the supply passing Bhavani bridge about 55 miles up stream of the Upper Anicut. Certain tributaries enter the Cauvery between these works and the irrigation on these amounts to 62,500 acres.

Column No. 6—Shows the supplies in column 2 when limited by the condition that up to 7 feet on the dam gauge the water is required for irrigation. I can recommend the entries column 6, Appendix VI, for acceptance as a correct representation of the supplies of water actually diverted and required in the last 20 years. Paragraphs 11 to 33 above explain the great variations in the supplies. I have made enquiries of the Chief Engineer regarding surplusing from the delta and in reply to my categorical questions he has informed me—that very little of the Cauvery and none of the Vennar drain into the Coleroon,—that in years of defective rainfall and short supply the surplus at the Lower Anicut is generally less than at the Upper Anicut, —and that in years of plentiful rainfall the reverse is the case and is chiefly due to floods which enter the Coleroon from the left bank. With regard to surplusing into the sea, there are no data to show what the quantities passed if any have been, but the depths run have been the least which would admit of satisfactory irrigation, more particularly in years of short supply and rainfall. We are chiefly concerned with the six years of short supply and rainfall and in these the surplused waters were *nil* or negligible. In years of more plentiful rainfall the delta subsoil appears to have acted as a great subsoil storage reservoir receiving excess water during periods of plentiful supply and giving it out in dry periods later on. Doubtless there were surpluses in years of heavy rainfall and abundant supply, but these occurrences do not affect the dry years of short supply which we have to consider.

20. *Comparative statement of supplies.*—Appendix VII has been compiled from Appendices V and VI and column 5 of the same shows the supplies which have to be maintained; it will be seen that the results for the five years ending 1909-1910 agree fairly well with those procured from the Administration Revenue Reports, this being due to greater attention being paid to discharge observations in later years. Although there are considerable differences between the supplies of water as given by the Administration Reports and as got by the special investigations carried out in connection with the Madras Cauvery Project, it will be observed that the results given in columns 4 and 5 both go to show—that large supplies have been used,—that the average head discharges as shown by column 2 have in many years been great, and that considerable remissions had to be made in the dry years, more especially in 1899-1900 when Rs 6,27,295 were remitted.

21. *Storage works for the delta.*– The successive efforts which have been made for the protection of the rice cultivation in the delta *emphasise the shortness of the river supply in dry years for the irrigation which depends on the Cauvery, and the impossibility of reducing it without interfering with existing rights.*—The various proposals and schemes have been as follows:—

1834—Sir Arthur Cotton's proposals.
1856—Major Lawford's proposed Neringipet reservoir.
Mr. Frazer's scheme for a reservoir on the Bhavani tributary of the Cauvery.
1869—Captain Smith's scheme for do do do
1880—Major Montgomerie's scheme for a reservoir do do
1884—Captain Romilly's do do do
1892—Mr. Larminie's do do do
1897—Mr. Hughes' do do do
———Colonel Smart's scheme for a Cauvery reservoir.
1904—Mr. Moss's do do
1909—Colonel Ellis's do do

Hence in a period of 75 years there have been 11 separate successive efforts to secure protection of existing rice irrigation in the delta; it is true that some of these schemes aimed at some extensions,—notably the last two,—but the leading idea has been protection of existing irrigation in dry years.

22. It appears to me that apart from expansions of irrigation the Madras Government may be held to have a prescriptive right for the extra supply of water which will obviate the heavy recurring losses shown in Appendix VII, column 6, and which they have been endeavouring to secure for the past 75 years, If I am right in this view, then, the low supplies shown in column 5 for the years 1894-1895, 1899-1900, 1904-1905, 1905-1906 and 1908-1909 of the Appendix just mentioned call for enhancement.

23. *Dewan's letter No.* 869—*Pol., dated* 27*th March* 1911.—I wish to offer the following remarks on what has been advanced by the Dewan of Mysore:—

Paragraph 1 *of Dewan's letter.*—It appears advisable to devise satisfactory arrangements for meeting the objections raised by the Madras Government.

Paragraph 2 of Dewan's letter.—It is understood that the pressing representations of the Kolar Gold Mining Companies were accompanied by threats to procure plant and steam power instead of hydro-electric power for extensions; and if this is the case, the urgency is manifest, since a good market should not be lost.

Paragraph 3 of Dewan's letter.—Rule III of the Agreement of 1892 may be complied with as regards supplying the Madras Government with full information relating to the project, if this has not already been done.

Paragraph 4 of Dewan's letter.—The curtailment of the supply for existing Mysore irrigation clearly indicates the need for more power; the proposed works would, according to the Madras Government, have a similar effect on irrigation in that presidency.

Paragraphs 5 and 6 of Dewan's letter.—The figures advanced in different papers are not in entire agreement; this shows the need for complying with Rule III of the Agreement; since the small dam of 80 feet in height has to be made of the full width for the ultimate height, it is absolutely necessary to first settle what this height is to be.

Paragraph 7 of Dewan's letter.—(i) The rule to run in the Cauvery all the water up to 7 feet on the gauge at the dam is the general present practice, and

reduction would mean serious loss of irrigation. A discharge of 26,680 cusecs amounts to about 2,300 million cubic feet per day. Appendix II, columns 3 and 4, of this note shows how the supplies have fluctuated in this flood-ridden river. The supply of 2,300 million cubic feet is exceptional, low supplies of one-third, one-fourth and one-fifth of this being more common. The maximum is one thing, the average another. Appendix V to this note, column 5, shows many average discharges over 12,000 cusecs ; however, in every year when the average was as low as 12,000 cusecs, the maximum was 26,680 when available. I would invite perusal of paragraphs 11 to 13 above.

(ii) In the five driest years we have as follows in million cubic feet :—

Year	Irrigation supply	Available for Mysore reservoir	Unavoidable surpluses of floods	Total river supply Aganda Cauvery
1	2	3	4	5
1890-1891	204,209	45,717	38,270	288,196
1894-1895	207,779	38,467	9,138	255,384
1899-1900	157,199	28,797	17,748	203,744
1905-1906	176,636	37,739	26,969	241,344
1908-1909	194,762	116,638	8,975	320,375

The entries in columns 2 and 5 are taken from Volume III, Part VIII, of the Madras Cauvery Project, those in column 3 from the working tables of the Mysore reservoir as furnished to the Durbar, while the entries in column 4 are the unavoidable surplus in floods. The sum of the entries in columns 3 and 4 show past surpluses which will be seen to be a very small part of the 225,000 stated by the Dewan to be surplused every year. In 1899-1900 the whole river supply including the "irrigation supply" of 157,199 was less than the 225,000 mentioned by the Dewan, while the actual surplus was only 28,797 million cubic feet. Column 3 of the above table will serve to show why the Mysore reservoir cannot receive 50,000 million cubic feet *in dry years* without curtailing the supply of existing irrigation—unless *a larger storage reservoir* is provided, and this is the course I advise as there is ample water to carry on from years of plentiful supply to supplement that received in dry ones.

(iii) The surplus of 28,797 should apparently be reduced by 15,169 to be surplused from Mysore reservoir.

Paragraph 8 of Dewan's letter.—The remarks made in this paragraph appear to me to call for the following comments.

(i) The Cauvery supplies abundant water—provided that sufficient storage capacity is provided to carry forward the flood supplies to meet the requirements of dry periods in advance ; the entries, Appendix VI, column 3, clearly show this. If the Mysore Cauvery Reservoir is made of adequate capacity, there will be ample water for all concerned ; *what is objected to is the proposal to reduce the supply at present required by the cultivators in Madras in order to save the Mysore State the cost of making a reservoir of suitable capacity.*

(ii) A Madras Cauvery Reservoir of 60,000 million cubic feet would usually suffice for the new irrigation ; but 90,020 gross and 80,000 net is provided for the reason just given—*vide* Project estimate, Volume I, paragraphs 56, 59 and 64. Similar liberal provision appears essential for the Mysore reservoir.

(ii) It appears to me that the question at issue is not one for decision on consideration of—

(*a*) location and relative extent of catchment areas,

(*b*) relative yield of catchment area in British and Mysore territory,

(*c*) relative extent of existing irrigation,

since this procedure would be completely subversive of prescriptive rights enjoyed in Madras from time immemorial, and of the reasonable rules already accepted in the Agreement of 1892, paragraphs II to IV, *vide* paragraph 4 above.

Paragraph 9 of Dewan's letter.—(i) The question at issue appears to be whether the Mysore State can be allowed to construct a storage reservoir of inadequate capacity—and to operate the same in a manner which will have a most prejudicial effect on existing irrigation in Madras, *vide* sub-paragraph (*i*) above.

(ii) The expenditure on the Madras works and the population to be provided for will be found vastly greater than in Mysore.

(iii) See 8 (i) above.

Paragragh 10 of Dewan's letter.—(i) The width of the 80 feet dam will be that which is required for the ultimate height to which the dam is eventually proposed to be carried; the ultimate height now proposed by the Durbar is inadequate, since the work would fail to meet requirements in 3 out of 20 years. I would advise as follows—

(*a*) That the Mysore Durbar reconsider the design with reference to what is suggested in sub-paragraph 8 (i) and (ii) above.

(*b*) That the complete amended project for the dam, and irrigation scheme with the rules for operating of the same may be referred to the Madras Government in accordance with the Agreement of 1892, Rules II to IV.

(*c*) That the Madras Government may report on the suitability of the amended proposals to Government of India, and if accepted by the latter, that permission may at once be given for execution of the work.

(ii) The Government of India have already received in the Madras Cauvery Project full particulars regarding the water actually used for irrigation purposes in the past, and the Mysore Durbar has also been supplied with a copy of that project; further data appear unnecessary on the subject of water-supply.

(iii) The third request made applies to the numerous sources of water-supply detailed in Schedules A and B of the Agreement of 1892; it would apply to all streams and rivers crossing a border of nearly 500 miles; its adoption would raise a dead wall of obstruction against progress in Madras,—such as obtains nowhere else in India. The existing Agreement of 1892 appears to be a very reasonable one; and it was concluded between the Madras and Mysore Governments; still, without even consulting the Madras Government, the party chiefly concerned—a request is made that Government of India will restrict itself to action which is tantamount to abrogation of the rules which now exist, and which render it possible to do the greatest amount of good to the greatest number. With regard to the case under consideration I wish to remark as follows:—

(i) The Agreement is dated 18th February 1892. The average irrigation on the Cauvery system apart from the Coleroon river has been as follows:—

Triennial period.	Average irrigation.
	Acs.
1878—81	1,002,240
1881—84	1,001,693
1884—87	942,067
1887—90	1,008,675
1890—93	1,011,151
1893—96	991,016
1896- 99	987,016
1899—02	980,644
1902—05	982,586
1905—08	990,251
1908—11	Report not received.

This statement shows no increase of irrigation and of prescriptive rights.

(ii) All the arguments advanced by the Madras Government against the present Mysore scheme relate solely to the prejudicial effect of the same on *existing irrigation.*

(iii) In the case of the Madras Cauvery project the abundant amount of storage is such that, if the rights of the existing irrigation are not prejudiced, the supply for the new work will meet requirements to the extent forecasted. The ample but unevenly distributed supply in the river is the explanation of this result.

None of the conditions explained in (i) to (iii) above, which are the most relevant circumstances in the case, afford any ground for the request advanced by the Mysore Durbar. For the reasons given above, I strongly advise that the request may not be complied with, and that the existing agreement continue in force.

Paragraph 11 of Dewan's letter.—The abundant data already collected appear to me to be ample; neither the Durbar nor the Resident have called attention to any subjects on which there is not already to hand ample information for disposal of the case under consideration.

Paragraph 12 of Dewan's letter.—A copy of the project has not been received in Government of India up to date, and it is required.

Paragraph 13 of Dewan's letter.—Reference to pargraph 6 of this note will serve to show that the Madras Government have already fully explained the requirements of the irrigation which has prescriptive rights,—and have invited the Mysore Durbar to advance a scheme for their works which will not reduce the supply of the existing irrigators,—nor infringe the existing agreement,—while meeting their own requirements. A solution of this character appears feasible, and is due from Mysore Durbar who know their own requirements. The action actually taken will be seen from paragraphs 10 and 13 of the Dewan's letter.

24. *Proposed solution of the question.*—The Madras Irrigation Officers represented to the Mysore Durbar the requirements of their irrigation which has prescriptive rights, and they showed that the design for the Mysore reservoir would fail in 3 out of 20 years; they asked that a design might be advanced by the Mysore Durbar which would not disturb existing rights and requirements, while meeting Mysore wants, but instead of doing so, an appeal has been made by the Mysore Durbar to Government of India, and requests made which I have shown above would not be in accordance with the Agreement of 1892, Rules II to IV, while the effect on existing irrigation in Madras would prove most disastrous. In what follows, I will advance such a solution as it would be my duty to propose if Mysore territory and all the interests concerned were those of Government of India. For the advancement of a sound scheme and one which would have any chance of acceptance by Government of India, and sanction by the Secretary of State, I would be under the necessity of advising that the scheme should be based on the following:—

(i) That working conditions and rules might be devised which would safeguard existing irrigation.

(ii) That provision might be made against the reservoir becoming inefficient through silting up in the next 100 years.

(iii) That existing irrigation should not be prejudiced, the Mysore reservoir being given such a capacity as would obviate this occurring.

I will now proceed to indicate what appear to me to be the requirements to comply with each of the issues (i) to (iii) above.

25. *Working conditions and rules.*—The conditions and proposed rules—paragraph 3 above, safeguard existing irrigation and appear to me to call for acceptance. It would be necessary for the working of these rules that a Government official should reside at Sivasamudram, or some other convenient location either in British or Mysore territory; that he should be allowed access to all the works on the power scheme or on the canal; that such gauges as may be considered necessary by Government may be recorded by the Mysore officials and copies supplied to the Government official; also, that such telegraph lines as may be required for operating of the scheme in Mysore State for distribution in accordance with the rules may be provided by that State; and that the free and unrestricted use of the same by the Government official may be a condition of the proposed works being agreed to. Since the proposed works are for the benefit of Mysore State, these conditions appear reasonable.

26. *Silting up of reservoir.*—This question has not been discussed in any of the papers which have been received, but still it is an important matter which cannot be ignored if works are to escape failure in the near future and condemnation by posterity. We have the following items of information on this subject:—

(i) Perusal of Volume I, paragraph 65, of the Madras Cauvery Project, will show that the silt swept along is estimated at 200 millions cubic feet per year on the average, so that the deposit would be as follows :—

(a) In 75 years	...	.....	...	15,000 millions cubic feet.
(b) In 100 years	...	.....	...	20,000 „ „

(ii) The actual provision for silt in the Madras Cauvery reservoir is about 10,000 millions cubic feet—this being the difference between 90,020 and 80,000; however, this reservoir can be emptied of water when a certain amount of the silt will be cleared out in its later stages; it is doubtful whether this will be feasible when a high level canal and power scheme depends on the reservoir. It appears probable that 10,000 millions cubic feet will be as useful in this case as 15,000 to 20,000 in the case of the Mysore reservoir. There is a further margin of 20,000 millions cubic feet of storage capacity in the case of the Madras Cauvery Reservoir —*vide* Volume I, paragraph 59 —so that the total margin is really 90,020—60,000 =30,020 millions cubic feet, and there is no apparent reason why a similar margin should not be required in the case of the Mysore reservoir.

(iii) Since irrigation works are usually designed in a lasting substantial manner—likely as far as we can see to last almost for eternity—it appears to me quite wrong to build a costly reservoir which will have a life of less than 100 years before it begins to be inefficient. In the case of the great Kistna reservoir it has been sought to give the works a life of 150 to 200 years, and great extra expenditure is proposed to be faced to attain this end.

(iv) In the case of small earthen reservoirs a surplus capacity of 10 per cent for silt over the gross initial capacity is useful—*vide* Mr. W. L. Strange's work on Indian Reservoir, paragraph 42.; however, the reservoirs which Mr. Strange appears to have had in view were small ones with earthen banks which can easily be raised, while this is not true of a masonry dam which must be given the full base width for the ultimate height. The 10 per cent. rule connotes in this case an efficient life of about 21 years only, and it appears quite intolerable to advance a work which will only meet requirements for this short period.

The provision for silt may then be put at that for 100 years or 20,000 millions cubic feet.

27. *Capacity of reservoir.*—Appendix VIII to this note has been prepared as follows :—

Column 2 has been extracted from Volume I, Cauvery Project, pages 208—212.

Columns 3 to 8 show particulars as given in the working tables of the Mysore reservoir furnished to the Durbar by the Chief Engineer, Madras.

The italicised figures are shortages and they show the extent to which the reservoir would have failed in the last twenty years if it had then existed; it will be seen that it was short by 13,203 millions cubic feet in 1906-07, while altogether there were no less than six years when there were lesser shortages. Examination of the figures given at the foot of Appendix VIII will show that the averages of lowest supplies and of the average carried forward were only about half of these for the proposed Madras Cauvery Reservoir,—a work which I merely mention to show how much more liberal the scope of its design is than that of the Mysore reservoir as regards provision of ample capacity. The total capacity which appears to me necessary to give the Mysore reservoir is as follows :—

	M. C. FT.
Below R. L. 2,404	4,480
As per Mysore Chief Engineer's note, dated 15th October 1910, paragraph 4, net storage	39,270
Add extra as above for capacity	13,203
Add extra for silt (20,000 — 4,480)	15,520
Total capacity ...	72,473

The extra capacity which I propose is therefore 30,973 millions cubic feet in excess of the 41,500 proposed by the Durbar; this increase is composed of the following :—

	M. C. FT.
Present shortage	13,203
Allowance for silt and margin of safety	17,770
Total ...	30,973

28. There ar· discrepancies between the capacity and height figures given in Dewan's letter and those deducible from the statement of capacities furnished to the Madras Government; in the absence of the final project figures and plants I am unable to ascertain which of the sets of figures advanced by Mysore is to be relied on as correct. The general effect will be to raise the full supply line of the dam by from 17 to 18 feet, but the complete project must be awaited in order to ascertain the levels which correspond to the requisite capacity.

29. *Design of the work.*—Government is concerned,—in the stability of the design as regards the safety of their delta canal works,—in the rock being of suitable quality for the foundations,—in the surplusing arrangements being suitable,—in the rock being such as will withstand the enormous surplused depths proposed,—in the cushioning,—and in the sluice arrangements. It is trusted that the works will be such as to effectually guard against any possible risk of failure; but as such, if it occurred, would react on the Government works, fully detailed plans are required under the terms of the Agreement of 1892 to admit of the officers of Government being in a position to discharge their responsibilities.

30. *Adequacy of supply for Mysore.*—Referring to Appendix VIII to this note, the supplies in column 2 show what the Madras Government claim for the irrigation of 1,100,000 acres of existing irrigation,—while those in column 3 show what are left over for the additional area which the Mysore Durbar propose to irrigate and which the Chief Engineer of that State gives as 125,000 acres in his note dated 15th October 1910, which was supplied to the Madras Government. Then we have as follows :—

$\frac{125,000}{1,100,000} \times 100 = 12$ per cent.

The entries in column 4 of Appendix VIII in every case exceed 12 per cent; so, as far as irrigation is concerned, the Mysore State is to receive in dry years more water acre per acre than the lands in British territory receive under the present system of relying on floods; however, stored water giving an assured supply will be used in Mysore State and it will go at least 50 per cent further which will more than compensate for the small part to be used for power; moreover, the extra storage now recommended will give a large margin of safety.

31. The figures for power which have been advanced are all that I have been circumstanced to consider; I presume that they are liberal and possibly that they may never be exceeded; with regard to untold extensions for extra power beyond the most sanguine dreams of the present, and which might conceivably call for throwing land out of cultivation in Mysore State or in the delta in order to supply extra power, it appears to me that the cultivation of wide tracts producing vast supplies of food-stuff for the people stands on a much higher plane than gold mining which is advanced for the enrichment of companies, and the increase of royalties. Most probably there will be enough water for both purposes for centuries to come, and it is hoped and trusted that this will be the case.

32. *Conclusions.*—The conclusions which I have arrived at are as follows :—

(i) That the existing Madras irrigation requires the supplies of water as actually diverted over the Cauvery Dam for irrigation in the past,—that no curtailment of these supplies is possible without inflicting very serious loss on the cultivators of the delta,—and that no reduction is compatible with the Agreement of 1892.

(ii) That the scheme for the proposed Mysore reservoir should be based on the surplus waters left over after operating the Madras Delta irrigation system as in (i) above; this is the proposal of the Madras Government—it appears reasonable,—and the impounding rules which they propose may be accepted.

(iii) That to admit of the proposed Mysore reservoir being successfully operated for both power and Mysore irrigation, it should apparently have the additional capacities (*a*) and (*b*) below:—

	M. C. FT.
(a) To meet shortage in dry years	13,203
(b) To provide for the silting up likely to occur, and so that it may remain fully efficient for a sufficient period ...	17,770
Total extra capacity now proposed	30,973
Add—Gross capacity proposed by Dewan	41,500
Gross capacity ...	72,473

These figures are subject to correction on receipt of the detailed project since there are apparent discrepancies in the figures hitherto reported in different papers received from Mysore.

(iv) That the surplus supplies of water available for Mysore and as intimated direct by the Madras Government are more than adequate for the additional area proposed to be irrigated in the State, provided that the requisite storage capacity—*vide* (iii) above—is provided for conserving the flood waters. This result appears to me to leave the Mysore State no apparent grounds for fearing that they will not have the means of protecting tracts which they desire to irrigate,—provided that they are prepared to execute the necessary works.

(v) That the proposed Madras Cauvery project is really a quite separate work from the question now under consideration as will be seen from sub-paragraphs (i) and (ii) above in which I have endeavoured to clearly explain that the Mysore Durbar are to have all the surplus supplies to which they have any claim under the existing Agreement placed unconditionally at their disposal. In anticipation of any further enquiries as to how the Madras Government can hope to carry out their large reservoir under the conditions, I may briefly remark that they propose,—to construct an unusually large storage reservoir,—to largly substitute stored water for floods thus increasing the efficiency and duty,—and doubtless also to conserve many of the largest floods which could not be utilised elsewhere by any other means and which would otherwise flow waste to the ocean; in short, they are to follow the identical course which I have now urged for adoption by Mysore Durbar.

J. BENTON,

Inspector-General of Irrigation.

APPENDIX I.

Dates of occurrence of freshets and floods in the Aganda Cauvery river.

Year	January	June	July	August	September	October	November	December
1890	5	7, 25	6, 19, 25	12, 21, 29	7	7, 29	6	11
1891	...	7, 23	10, 26	9	1, 6	2, 5, 7, 11, 14, 17, 19, 22, 29	4, 14	17, 29
1892	...	8, 16, 19	1, 15, 24, 26	4, 15, 24	1, 8, 15, 25	1, 3, 6, 9, 13, 17, 22	1, 11, 27	2, 6, 10, 17, 19
1893	25	10, 14, 21, 30	9, 13, 28	6, 8, 13, 30	3, 8, 17	4, 8, 13, 19, 25, 28	7, 11, 16, 18 24, 29	...
1894	...	6, 23	3, 16, 18, 23	9, 13, 20, 24, 29	14, 23	21	2, 4, 9	5
1895	...	5, 12, 16, 23	4, 18, 24, 28	4, 12, 24, 31	18, 26, 30	3, 9, 20, 23, 25	6	1, 31
1896	...	6, 17, 25, 27	2, 18, 31	2, 14, 18, 31	4, 8, 25, 29	4, 24	5, 19, 21, 26	2, 9, 21
1897	...	4, 11, 23	2, 15, 24	1, 14, 30	2, 8, 12, 22, 30	2, 15, 18	2, 5, 16	2
1898	...	21	11, 20, 31	10, 19, 30	9, 17, 29	2, 10, 12, 20, 31	13, 15	3, 31
1899	...	21	5, 14	3, 15	7, 9, 20, 23	13, 18, 28	...	6, 10
1900	14	2, 9, 21, 27	3, 6, 19	1, 4, 8, 15	3,10. 12, 16	4, 18	1, 20, 25	2, 18, 23
1901	14	6, 16, 21	3, 10, 13, 31	9, 19	13, 17, 19, 28	1, 4, 8, 25, 29	11, 20	2
1902	10	4, 19	12, 18	2, 27, 29	5, 13	12, 16, 28	1, 4, 9, 17, 22	8, 13, 19
1903	...	18, 20	5, 19, 30	1, 15, 25	3, 6, 11, 17, 26, 29	2, 4, 24, 28	14	1, 6, 8
1904	2, 23	4, 13, 16, 24	8, 27	10, 14	18, 26	9, 15, 22, 25, 29	13	...
1905	...	8, 25	2, 12, 26	18, 31	3, 12, 21	7, 11, 16, 19	14, 28	...
1906	22	9, 18, 28	16, 28	13, 20, 30	10, 19, 25	9, 13, 17, 21, 26	11, 16	24
1907	2	9, 19, 23	4, 28	11	1, 26, 30	6, 27	8, 11, 21,	17, 23
1908	16, 21	1, 14, 25	8, 21, 29	1, 8	4, 12	7, 24, 29	...	7, 18, 24
1909	4	12	1, 21, 29	9	4, 16, 30	8, 18	6	3, 18

APPENDIX II.

Discharge in millions cubic feet.

Year	Period	Cauvery river discharges				Coleroon river discharges when carrying water		
	I—1st to 15th II—16th to 30th	In the past			Madras project supply	Number of days	Discharges	
		From	To	Irrigation supply			From	To
1	2	3	4	5	6	7	8	9
		JUNE 1890 TO 1909.						
1890	I	236	513	348	356	0 out of 15	...	...
	II	254	1,116	609	356	0 ,, 15	...	...
1891	I	172	803	423	356	0 ,, 15	...	...
	II	254	628	409	356	0 ,, 15	...	...
1892	I	370	754	535	356	0 ,, 15	...	...
	II	434	1,693	750	356	2 ,, 15	14	294
1893	I	434	1,248	903	356	3 ,, 15	86	138
	II	851	3,029	1,893	356	13 ,, 15	239	1,901
1894	I	370	657	453	356	0 ,, 15	...	...
	II	594	1,944	1,205	356	9 ,, 15	86	553
1895	I	144	338	224	356	0 ,, 15	...	...
	II	144	4,005	1,539	356	10 ,, 15	345	4,493
1896	I	158	374	283	356	0 ,, 15	...	...
	II	218	5,324	1,561	356	9 ,, 15	1,175	6,576
1897	I	186	494	374	356	0 ,, 15	...	..
	II	386	4,325	1,711	356	11 ,, 15	79	5,184
1898	I	172	322	269	...	0 ,, 15	...	...
	II	254	2,342	1,610	356	10 ,, 15	14	1,296
1899	I	254	370	273	356	0 ,, 15	...	...
	II	236	3,389	1,388	356	7 ,, 15	79	3,145
1900	I	130	402	265	356	0 ,, 15	...	...
	II	114	2,946	1,316	356	7 ,, 15	239	1,780
1901	I	254	472	327	356	0 ,, 15	...	
	II	418	2,658	1,352	356	5 ,, 15	513	1,673
1902	I	98	354	238	356	0 ,, 15	114	1,521
	II	114	1,345	563	356	1 ,, 15	92	92
1903	I	254	538	386	356	0 ,, 15	...	...
	II	402	1,170	637	356	0 ,, 15	...	...
1904	I	516	1,755	1,013	356	0 ,, 15	...	...
	II	730	3,644	1,908	356	14 ,, 15	806	3,802
1905	I	200	402	289	...	0 ,, 15	...	...
	II	130	1,818	550	356	0 ,, 15	...	...
1906	I	32	130	46	..	0 ,, 15	...	...
	II	50	803	272	...	1 ,, 15	657	657
1907	I	254	418	337	356	0 ,, 15	...	⋮
	II	272	2,070	987	356	0 ,, 15	...	...
1908	I	50	354	159	356	0 ,, 15	...	...
	II	172	628	351	356	0 ,, 15	...	...
1909	I	272	3,534	1,245	356	11 ,, 15	445	3,611
	II	838	2,160	1,090	356	6 ,, 15	354	2,078
		JULY 1890 TO 1909.						
1890	I	472	1,404	829	1,727	2 out of 15	14	79
	II	838	3,884	1,721	1,609	9 ,, 16	415	3,629
1891	I	254	2,631	1,498	1,727	9 ,, 15	345	1,542
	II	892	4,842	1,771	1,609	10 ,, 16	86	5,581
1892	I	402	3,536	1,287	1,727	7 ,, 15	14	3,145
	II	1,560	6,587	2,172	1,609	16 ,, 16	79	9,332
1893	I	1,060	1,885	1,470	1,727	8 ,, 15	92	294
	II	1,060	1,755	1,418	1,609	8 ,, 16	14	189
1894	I	450	1,062	591	1,727	0 ,, 15	...	...
	II	1,062	4,842	1,816	1,609	13 ,, 16	198	5,581
1895	I	1,232	3,884	1,833	1,727	10 ,, 15	62	3,629
	II	1,430	2,145	1,740	1,609	15 ,, 16	14	483
1896	I	1,430	4,478	2,077	1,727	13 ,, 15	14	4,838
	II	1,716	3,367	2,195	1,609	16 ,, 16	79	13,582
1897	I	516	5,227	1,277	1,727	7 ,, 15	1,175	6,337
	II	1,430	4,650	1,933	1,609	16 ,, 16	79	6,377
1898	I	402	1,625	935	1,727	4 ,, 15	62	86
	II	450	4,564	1,305	1,609	6 ,, 16	415	5,011
1899	I	516	3,488	2,026	1,727	13 ,, 15	345	2,833
	II	494	2,145	1,024	1,609	3 ,, 16	14	345
1900	I	3,098	3,488	2,300	(a) 356	3 ,, 15	2,056	2,833
	II	2,002	6,498	2,291	(b) 1,727	...	239	7,989
1901	I	386	4,791	1,648	1,727	10 out of 15	307	6,214
	II	1,573	3,410	2,099	1,609	12 ,, 16	375	2,893
1902	I	144	2,620	902	1,727	5 ,, 15	314	955
	II	1,645	6,742	2,181	1,609	16 ,, 16	60	7,375
1903	I	322	516	385	1,727	1 ,, 15	2,415	2,415
	II	2,460	6,100	2,300	1,609	16 ,, 16	284	14,148
1904	I	2,580	4,938	2,551	1,727	15 ,, 15	299	3,834
	II	1,859	2,996	2,301	1,609	5 ,, 16	278	1,296

With the following exceptions—

(a) For 3 days.

(b) For 28 days.

Discharge in millions cubic feet—*contd.*

Year	Period	Cauvery river discharges				Coleroon river discharges when carrying water		
		In the past			Madras project supply	Number of days	Discharges	
	I –1st to 15th II—16th to 31st	From	To	Irrigation supply			From	To
1	2	3	4	5	6	7	8	9
		JULY 1890 TO 1909—*contd.*						
1905	I	1,579	2,624	1,829	(c) 856	5 out of 15	254	1,158
	II	472	4,052	1,600	(d) 1,727	11 ,, 16	511	3,951
1906	I	114	4,291	356	(e) 356	4 ,, 15	1,681	3,467
	II	2,277	3,890	1,669	(f) 1,727	10 ,, 16	2,395	4,923
1907	I	402	2,779	1,359	1,727	6 ,, 15	102	2,910
	II	402	4,085	1,316	1,609	4 ,, 16	1,860	3,067
1908	I	338	2,923	1,493	1,727	6 ,, 15	491	4,333
	II	1,120	3,644	2,153	1,609	11 ,, 16	430	4,104
1909	I	1,950	3,566	2,211	1,727	4 ,, 15	786	4,273
	II	2,798	5,326	2,319	1,609	14 ,, 16	174	5,007
		AUGUST 1890 TO 1909.						
1890	I	1,430	3,098	1,987	1,531	15 out of 15	14	2,056
	II	1,060	1,885	1,408	1,531	11 ,, 16	62	1,296
1891	I	1,950	4,052	2,239	1,531	15 ,, 15	345	397
	II	1,166	2,002	1,478	1,531	6 ,, 16	14	239
1892	I	2,607	3,098	2,305	1,531	15 ,, 15	345	2,056
	II	1,788	2,300	2,054	1,531	16 ,, 16	86	689
1893	I	1,450	3,020	1,980	1,531	15 ,, 15	14	1,901
	II	780	1,625	1,113	1,531	4 ,, 16	62	138
1894	I	1,060	2,090	1,545	1,531	9 ,, 15	62	453
	II	1,560	2,650	1,908	1,531	16 ,, 16	79	1,296
1895	I	1,755	4,392	2,245	1,531	15 ,, 15	415	3,802
	II	1,502	2,300	1,850	1,531	14 ,, 16	14	689
1896	I	3,408	8,061	2,300	1,531	15 ,, 15	1,659	12,839
	II	1,931	3,078	2,272	1,531	16 ,, 16	189	3,975
1897	I	1,950	6,786	2,263	1,531	15 ,, 15	345	10,005
	II	2,074	5,227	2,281	1,531	16 ,, 16	294	4,320
1898	I	1,430	4,052	1,951	1,531	15 ,, 15	14	3,975
	II	591	1,300	941	1,531	0 ,, 16	...	...
1899	I	200	1,638	460	1,531	1 ,, 15	239	239
	II	386	1,315	658	1,531	1 ,, 16	62	62
1900	I	3,159	8,932	2,300	1,531	15 ,, 15	1,542	13,077
	II	1,573	8,199	2,067	1,531	16 ,, 16	14	14,199
1901	I	1,690	3,020	2,017	1,531	15 ,, 15	169	2,051
	II	1,240	3,020	1,786	1,531	10 ,, 16	238	2,051
1902	I	662	2,699	1,518	1,531	10 ,, 15	92	481
	II	418	1,116	680	1,531	0 ,, 16	...	...
1903	I	1,645	6,878	3,055	1,531	15 ,, 15	11	8,466
	II	1,625	2,300	1,995	1,531	10 ,, 16	281	1,406
1904	I	1,232	2,724	1,969	1,531	9 ,, 15	522	1,600
	II	494	2,650	1,408	1,531	2 ,, 16	233	635
1905	I	538	2,650	1,486	1,531	2 ,, 15	48	396
	II	516	1,345	906	1,531	0 ,, 16	...	...
1906	I	1,364	2,336	1,993	1,531	8 ,, 15	50	2,336
	II	1,430	4,392	2,024	1,661	15 ,, 16	22	5,982
1907	I	1,950	5,130	2,267	1,531	15 ,, 15	1,418	6,195
	II	2,915	4,737	2,300	1,531	16 ,, 16	688	3,631
1908	I	2,370	4,550	2,300	1,531	15 ,, 15	1,666	7,413
	II	981	2,684	1,729	1,531	1 ,, 16	314	314
1909	I	2,222	3,322	2,295	1,531	12 ,, 15	237	3,450
	II	662	2,299	1,641	1,531	7 ,, 16	1,825	3,313
		SEPTEMBER 1890 TO 1909.						
1890	I	538	1,560	824	1,371	0 out of 15	...	...
	II	402	560	505	815	0 ,, 15	...	...
1891	I	814	1,755	1,211	1,371	5 ,, 15	14	79
	II	450	892	587	815	0 ,, 15	...	...
1892	I	1,625	2,872	2,019	1,371	15 ,, 15	86	1,659
	II	892	1,560	1,116	815	2 ,, 15	14	79
1893	I	1,300	2,580	1,676	1,371	12 ,, 15	14	1,175
	II	560	1,950	1,100	815	4 ,, 15	79	239
1894	I	892	1,300	1,109	1,371	0 ,, 15	...	...
	II	491	1,120	787	815	0 ,, 15	...	...
1895	I	594	1,502	833	1,371	0 ,, 15	...	...
	II	516	2,070	897	815	3 ,, 15	239	239
1896	I	1,180	2,115	1,754	1,371	13 ,, 15	14	315
	II	916	2,000	1,234	815	3 ,, 14	14	483
1897	I	1,573	3,579	2,075	1,371	15 ,, 15	14	2,367
	II	981	4,746	1,865	815	10 ,, 15	14	5,383
1898	I	678	5,280	1,271	1,371	6 ,, 15	14	1,175
	II	1,430	3,664	1,872	815	15 ,, 15	14	3,145

With the following exceptions—

(c) For 5 days.
(d) ,, 24 ,,
(e) For 25 days.
(f) ,, 6 ,,

Discharge in millions cubic feet—*contd.*

Year	Period	Cauvery river discharges				Coleroon river discharges when carrying water		
		In the past			Madras project supply	Number of days	Discharges	
	I—1st to 15th II—16th to 30th	From	To	Irrigation supply			From	To
1	2	3	4	5	6	7	8	9
				SEPTEMBER 1890 TO 1909.				
1899	I	516	2,007	1,176	1,371	7 out of 15	79	623
	II	594	2,580	1,472	815	7 ,, 15	62	1,542
1900	I	1,364	2,724	1,752	1,531	10 ,, 15	62	1,419
	II	833	2,798	1,276	815	5 ,, 15	14	1,542
1901	I	594	1,180	886	1,371	0 ,, 15	...	...
	II	784	2,510	1,481	815	5 ,, 15	169	1,167
1902	I	706	3,176	1,739	1,371	9 ,, 15	105	5,051
	II	838	2,580	1,543	815	7 ,, 15	90	275
1903	I	1,000	2,440	1,418	1,371	12 ,, 15	392	1,687
	II	1,300	2,090	1,557	815	12 ,, 15	181	3,013
1904	I	354	472	396	1,371	0 ,, 15	...	...
	II	370	2,070	988	815	0 ,, 15	...	...
1905	I	784	1,755	1,268	1,531	4 ,, 15	168	1,320
	II	338	1,365	707	975	0 ,, 15	...	...
1906	I	892	2,798	1,914	1,531	5 ,, 15	797	3,340
	II	626	1,625	1,120	897	0 ,, 15	...	...
1907	I	981	2,607	1,901	1,371	3 ,, 15	882	1,542
	II	516	2,099	921	815	1 ,, 15	717	717
1908	I	560	1,950	1,058	1,371	3 ,, 15	563	690
	II	322	594	397	815	0 ,, 15	...	...
1909	I	946	2,650	1,638	1,371	15 ,, 15	1,790	3,890
	II	418	1,120	605	815	15 ,, 15	1,101	2,325
				OCTOBER 1890 TO 1909.				
1890	I	450	1,287	653	1,009	0 out of 15	...	...
	II	386	3,388	833	635	8 ,, 16	1,542	3,300
1891	I	472	1,755	1,115	1,009	7 ,, 15	14	345
	II	1,287	3,020	1,848	635	14 ,, 16	14	1,901
1892	I	784	1,300	1,102	1,009	0 ,, 15	...	...
	II	730	1,690	1,322	635	7 ,, 16	62	138
1893	I	730	4,564	1,840	1,009	10 ,, 16	62	5,011
	II	1,495	2,440	1,952	635	.....	62	1,419
1894	I	354	494	403	1,009	0 ,, 15	...	...
	II	657	2,070	1,355	635	10 ,, 16	62	689
1895	I	1,240	2,872	1,687	1,009	11 ,, 15	14	1,659
	II	1,180	1,885	1,493	635	8 ,, 16	14	294
1896	I	1,060	2,650	1,686	1,009	9 ,, 15	14	1,296
	II	628	946	720	685	0 ,, 16	...	...
1897	I	1,602	5,130	2,166	1,009	15 ,, 15	14	6,187
	II	662	3,254	1,450	639	7 ,, 16	62	2.367
1898	I	2,090	4,052	2,272	1,009	15 ,, 15	483	1,419
	II	1,041	3,408	1,945	635	11 ,, 16	79	2,056
1899	I	402	662	489	1,009	0 ,, 15	...	...
	II	538	730	645	635	0 ,, 16	...	...
1900	I	418	2,580	1,043	815	4 ,, 15	62	1,175
	II	494	3,020	1,278	508 / 712	5 ,, 16	79	1,901
1901	I	1,296	3,254	2,097	1,009	13 ,, 15	100	2,557
	II	516	3,098	1,459	635	7 ,, 16	444	2,220
1902	I	434	2,872	1,175	1,009	5 ,, 15	218	2,121
	II	516	3,020	1,392	635	6 ,, 16	1,079	2,306
1903	I	1,300	3,410	1,951	1,009	12 ,, 15	91	4,271
	II	1,430	2,798	2,015	635	10 ,, 16	504	3,919
1904	I	370	662	444	1,009	0 ,, 15	...	...
	II	386	1,287	381	635	0 ,, 16	...	...
1905	I	322	1,462	752	815	5 ,, 15	884	1,874
	II	402	2,133	991	508 / 702	8 ,, 16	149	2,759
1906	I	418	2,650	1,444	815	6 ,, 15	355	2,638
	II	628	3,200	1,093	815 / 508	10 ,, 16	2,015	3,520
1907	I	494	2,580	1,244	1,009	7 ,, 15	99	2,060
	II	370	1,681	727	635	3 ,, 16	584	1.612
1908	I	354	594	425	1,009	0 ,, 15	...	...
	II	338	2,070	774	635	3 ,, 16	1,043	1,234
1909	I	494	2,918	1,501	1,009	15 ,, 15	349	3,897
	II	594	2,872	1,559	635	8 ,, 16	587	3,860

APPENDIX III.

Average rainfall, Tanjore District, in inches.

Year	June	July	August	September	October	November	December	January	Total
1890—91	3·05	2·20	5·01	6·35	11·74	7·61	0·94	0·21	37·11
1891—92	0·77	0·80	1·87	1·30	14·71	5·99	16·83	0·16	42·43
1892—93	3·59	2 89	8·10	2·08	4·47	2·30	3·10	0·11	27·64
1893—94	1·82	7·56	1·85	2·23	4·61	24·63	3·60	1·84	48·34
1894—95	0·40	0·93	5·54	5·93	4·81	8·94	6·05	0·04	32·66
1895—96	0·37	2·15	8·42	7·01	12.65	10·00	11·24	0·15	51·99
1896—97	1·24	1·28	1·94	3·51	6·63	15·47	14·51	0·04	41·62
1897—98	1·09	0·97	5·46	8·00	3·34	3·04	4·04	1·27	27·21
1898—99	0·95	1·37	5·05	5·83	10·43	18·92	12·35	0·40	55·30
1899—1900	0·51	0·79	1·53	4·53	18·66	5·78	2·51	0·38	34·69
1900—1901	0·82	3·96	1·44	6·75	6·95	11·25	8·52	0·62	42·31
1901—1902	0·51	0·90	3·07	9·33	3·17	12·58	5·54	5·45	40·55
1902—1903	1·84	0·78	4·32	4·18	11·10	12·67	11·98	1·49	48·26
1903—1904	2·20	1·71	5·69	12·49	3·57	7·51	18·08	3·97	55·22
1904—1905	0·66	2·38	2·06	2·86	5·55	2·17	6·26	0·25	24·18
1905—1906	0·81	0·61	4·70	4·03	11·43	8·96	0·49	2·78	38·83
1906—1907	1·56	1·86	7·96	1·32	9·61	19·65	10·03	0·53	52·52
1907—1908	1·02	1·16	2·12	4·79	9·24	14·07	2·50	0·69	35·59
1908—1909	1·86	1·06	1·92	7·00	13·84	1·56	3·68	5·40	36·32
1909—1910	0·35	0·81	8·74	5·21	2·36	2·61	2·12	0·87	23·02
Average for 3 years ...	1·54	2·15	4·30	4·72	8·05	10·65	7·92	1·04	40·37

APPENDIX IV.

Comparison of the Godavari, Kistna and Cauvery Irrigation systems.

Particulars		1903—1904	1904—1905	1905—1906	1906—1907	1907—1908
Godavari.						
(*a*) Average rainfall	Inches	57·80	30·31	24·94	41·07	40·00
(*b*) Area irrigated	Acres	785·560	869·980	910·317	872·849	911·919
(*c*) Actual supply	Millions cubic feet ...	158·942	176·014	141·940	154·286	140·018
(*d*) Supply per acre	C. ft.	202·216	202·315	155·923	176·762	153·542
(*e*) Discharge of river ...	Millions cubic feet ...	4,089·439	1,877·445	2,244·687	3,092·163	5,842·418
(*f*) Percentage % × 100 ...	Per cent	4	9	6	5	3
Kistna.						
(*a*) Average rainfall	Inches	57·44	28·37	25·26	34·50	25·70
(*b*) Area irrigated	Acres	617·042	648·247	657·604	662·959	685·434
(*c*) Actual supply	Millions cubic feet ...	107·442	120·954	24·507	92·519	96·898
(*d*) Supply per acre	C. ft.	174·139	186·659	143·714	139·563	141·367
(*e*) Discharge of river ..	Millions cubic feet ...	2,803·060	1,481·406	1,049·889	1,628·440	2,112·151
(*f*) Percentage % × 100 ..	Per cent	4	8	9	5	4
Cauvery.						
(*a*) Average rainfall	Inches	53·61	16·04	37·28	56·70	40·83
(*b*) Area irrigated	Acres	1,039·056	1,055·133	1,103·059	1,094·303	1,105·410
(*c*) Actual supply	Millions cubic feet ...	279·614	184·732	207·820	223·509	236·446
(*d*) Supply per acre	C. ft.	269·114	175·100	188·419	204·304	213·978
(*e*) Discharge of river ...	Millions cubic feet ...	700·564	329·269	241·344	376·091	439·258
(*f*) Percentage % × 100 ...	Per cent	40	76	86	65	54

APPENDIX V.

Prepared from Revenue Administration Reports.

Year	Rainfall 1st June to 31st January	Crop period in days		Average discharge at head		Area charged as irrigated		Total	Total supply of Cauvery	Supply for Coleroon		Total supply
		First crop	Second crop	First crop	Second crop	First crop	Second crop					
1	2	3	4	5	6	7	8	9	10	11	12	13
				Cusecs.	Cusecs.	Acs.	Acs.	Acs.	M. c. ft.	Acs.	M. c. ft.	M. c. ft.
1890—91	37·11	123	181	12,017	81	911,401	101,943	1,013,344	129,078	113,336	14,342	143,420
1891—92	42·43	123	181	11,246	568	908,616	99,443	1,008,059	128,398	106,669	14,266	142,659
1892—93	27·64	123	181	12,342	769	912,785	99 264	1,012,049	143,184	111,217	15,909	159,093
1893—94	48·34	123	181	14,738	1,439	888,485	107,570	996,055	179,123	112,666	19,902	199,025
1894—95	32·66	123	181	11,252	379	886,461	103,430	989,891	125,501	111,666	13,944	139,445
1895—96	51·99	123	181	13,858	1,076	886,330	190,773	987 103	164,095	111,251	18,233	182,238
1896—97	44·62	123	181	17,193	2,868	882,586	94,537	977,123	227,560	106,844	25,285	252,845
1897—98	27·21	183	121	18,074	890	886,920	102,888	989,808	205,990	111,267	22,878	228,878
1898—99	55·30	123	181	13,128	2,174	884,869	109,249	994,118	173,508	117,724	19,267	192,775
1899—1900	34·89	123	181	10,290	509	859,268	94,855	954,123	117,312	99,301	11,731	129,043
1900– 1901	40·31	123	181	20,735	596	894,414	90,175	993,589	229,671	110,568	25,519	255,190
1901—1902	40·55	123	181	15,828	2,329	894,072	100,148	994,220	204,624	108,686	22,736	227,360
1902—1903	48·26	123	181	12,106	2,843	853,451	87,810	941,261	173.109	108,057	19,234	192,340
1903--1904	55·22	123	181	15,418	3,792	845,235	84,584	929,819	223,146	109,237	24,794	247,943
1904—1905	24·18	123	181	11,931	137	855,004	90,744	945,748	128,933	109,385	14,315	143,248
1905—1906	33 83	123	181	12,548	2,041	897,892	95,724	993,616	165,265	109,443	18,363	183,628
1906—1907	52·52	123	181	12,639	3,286	894,245	88,861	983,106	185,701	111,197	20,633	206,334
1907—1908	35·59	153	121	14,903	8,605	900,972	93,237	994,209	236,777	111,201	26,309	263,086
1908—1909	36·32	153	121	13,395	...	903,989	92,961	996,950	177,068	114,738	18,563	195,632
1909—1910	23·02	153	121	19,089	...	904,682	98,967	1.003,649	252,337	113,961	28,036	280,373

NOTE.—The number of days for first crop are inadequate where 123 are given.

APPENDIX VI.

STATEMENT of annual supplies, Cauvery river, for the 20 years ending 1909-1910, in millions cubic feet. The entries in the second column comprise those in the last one.

Year	Cauvery dam	Upper Anicut into Coleroon	Total Aganda Cauvery	Cauvery-Bhavani Bridge	"Irrigation supply" limited to 7 feet over Cauvery dam, 26,500 cusecs
1	2	3	4	5	6
1890—1891	225,302	62,894	288,196	212,716	204,209
1891—1892	260,013	75,886	335,899	255,247	234,892
1892—1893	282,643	100,042	382,685	345,379	246,637
1893—1894	326,551	69,201	395,752	316,461	309,513
1894—1895	217,923	37,161	255,384	216,998	207,779
1895—1896	299,587	89,512	389,099	294,155	273,365
1896—1897	422,540	260,333	682,873	551,482	310,678
1897—1898	393,379	236,663	630,042	540,487	299,394
1898—1899	351,568	109,794	461,362	341,285	315,730
1899—1900	166,457	37,287	203,744	174,434	157,199
1900—1901	391,191	258,582	649,763	523,033	270,580
1901—1902	334,082	116,722	450,804	336,176	303,263
1902—1903	293,629	118,903	412,532	311,700	263,964
1903—1904	407,641	292,923	700,564	519,705	349,395
1904—1905	250,736	78,533	329,269	337,267	216,300
1905—1906	185,994	55,350	241,344	211,321	176,636
1906—1907	243,397	132,694	376,091	318,402	223,131
1907—1908	295,859	143,399	439,258	389,899	241,750
1908—1909	220,127	100,248	320,375	251,529	194,762
1909—1910	313,084	252,932	566,016	401,789	272,464

APPENDIX VII.

COMPARATIVE statement of supplies of water used in Cauvery.

Year	Average discharges at head		Quantities of water used		Remission
	First crop	Second crop	Appendix V	Appendix VI	
1	2	3	4	5	6
	CUSECS.	CUSECS.	M. C. FT.	M. C. FT.	Rs.
1890—1891	12,027	81	143,420	204,209	.....
1891—1892	11,246	568	142,659	234,892	.....
1892—1893	12,342	769	159,093	246,637	.....
1893—1894	14,736	1,439	199,025	309,513	.....
1894—1895	11,252	379	139,145	207,779	.....
1895—1896	13,858	1,076	182,238	273,365	.....
1896—1897	17,193	2,868	252,845	310,678	11,837
1897—1898	18,074	890	228,878	299,394	.....
1898—1899	13,128	2,171	192,775	315,730	.....
1899—1900	10,290	509	129,043 (a) 152,951	157,199	6,27,295
1900—1901	20,735	596	255,190	270,580	14,823
1901—1902	15,828	2,329	2 7,360 314,677	303,263	8,075
1902—1903	12,106	2,813	192,343	263,964	.....
1903—1904	15,118	3,792	217,940	349,395	.....
1904—1905	11,931	137	143,248	216,300	67,057
1905—1906	12,548	2,011	183,628	176,636	15,857
1906—1907	12,639	3,286	206,331	223,131	44,969
1907—1908	14,903	3,805	263,086 (a) 263,143 195,632	241,750	6,571
1908—1909	13,395	Omitted in reports.	(a) 171,422 280,373	194,762	35,208
1909—1910	19,089		(a) 280,373 (a) 280,381	272,464	25,470

(a) These entries are as per volumes used per acre.

APPENDIX VIII.

COMPARATIVE supplies of reservoirs in millions cubic feet.

Year	Existing irrigation supply, Madras	Mysore reservoir gross 41,500 and net 37,100 m.c.ft.				Madras reservoir, gross 90,020 and net 80,060 m. c. ft.	
		Available surplus supply	Percentage of column 3 on column 2	Minimum supply in reservoir	Reservoir supply carried forward	Minimum supply in reservoir	Supply in reservoir carried forward
1	2	3	4	5	6	7	8
1890—1891	204,209	45,717	22	5,896	5,869	6,154	27,272
1891—1892	234,892	82,206	35	3,900	5,736	16,716	38,692
1892—1893	246,637	113,950	46	12,304	12,719	32,281	64,506
1893—1894	309,513	44,857	14	4,985	4,985	49,864	80,000
1894—1895	207,779	38,467	18	—8,095	—8,095	12,929	24,983
1895—1896	273,365	71,760	26	—373	10,683	17,775	55,937
1896—1897	310,678	275,405	89	6,433	6,436	50,047	80,000
1897—1898	299,394	246,252	83	5,328	25,235	68,899	76,051
1898—1899	315,730	77,377	25	24,560	34,545	35,981	80,000
1899—1900	157,199	28,797	18	—1,526	—1,526	—23,487	8.989
1900—1901	270,580	273,270	100	—3,543	15,594	8,989	66,913
1901—1902	303,263	68,250	22	655	2,332	62,067	80,000
1902—1903	263,964	89,535	34	11,095	13,767	50,769	80,000
1903—1904	349,395	215,987	62	15,804	28,563	48,391	80,000
1904—1905	216,300	100,949	47	4,436	4,436	—10,730	8,989
1905—1906	176,656	87,739	21	—7,922	—7,922	—17,538	8,989
1906—1907	223,131	89,650	40	13,203	14,608	8,989	67,316
1907—1908	241,750	175,704	72	8,326	9,308	52,084	77,398
1908—1909	194,762	104,565	54	8,015	27,481	15,389	24,776
1909—1910	272,464	116,638	43	22,905	22,905	24,776	60,911
Average ...	.....	.....	...	5,000	11,383	25,517	54,581
Percentage of net capacity ...	.....	.....	...	8 per cent.	36 per cent.	32 per cent.	68 per cent.

V

Letter No. 921-I, dated Simla, the 16th August 1911, from Mr. H. M. Willmott, Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch.

In continuation of this office letter No. 759-I., dated the 15th July 1911, I am directed to forward, for the information of the Government of Madras, a copy of the report on the Mysore Cauvery Reservoir Project.

2. I am to enquire whether the measures proposed in the note, dated the 12th May 1911, by the Inspector-General of Irrigation, a copy of which was forwarded with the letter referred to above, will fully safeguard the interests of the Madras Government.

VI

Letter No. 975-I, dated Simla, the 28th August 1911, from the Hon'ble Mr. W. B. Gordon, C.I.E., Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch.

In continuation of Mr. Willmott's letter No. 921-I., dated the 16th August 1911, I am directed to forward, for the information of the Government of Madras, the papers noted in the margin regarding the proposed construction by the Mysore Durbar of a reservoir on the Cauvery river. In doing so, I am to express the desire of the Government of India that the local Government will do all that is within their power to expedite a settlement of the questions at issue between them and the Government of Mysore, more especially with regard to the proposal for the immediate construction of the lower dam and smaller reservoir referred to in paragraph 14 of Mr. Visvesvaraya's note, dated 8th May 1911, and the concluding portion of paragraph 6 of Sir John Benton's note, dated 28th July 1911.

(1) Copy of letter No. 1824-I. B., dated 25th August 1911, from the Government of India in the Foreign Department, to the Resident in Mysore, and its enclosure.
(2) Copy of letter No. 4038, dated 8th July 1911, from the Resident in Mysore and its enclosures (except the report on the Mysore Cauvery Reservoir Project, a copy of which has already been supplied).

ENCLOSURES.

(i)

Letter No. 4038, dated Bangalore, the 8th July 1911, from the Hon'ble Lieut.-Col. H. Daly, C.S.I., C.I.E., Resident in Mysore, to the Secretary to the Government of India, Foreign Department.

With reference to your letter No. 1315-I.B., dated the 27th June 1911, regarding the proposal of the Mysore Durbar to construct a reservoir on the Cauvery river, I have the honour to forward herewith, for favour of the early consideration of the Government of India, a copy of letter No. 27-Pol., dated the 7th July 1911, with enclosure, from the Dewan of Mysore.

2. The eighth paragraph of the Dewan's letter explains how urgently desirable it is, from the Durbar's point of view, to procure an immediate decision on the question.

3. Copies of the marginally-noted papers which are quoted in paragraphs 2 and 6 of the present letter from the Dewan are also forwarded herewith for reference.

(1) Printed report and papers on the Cauvery Reservoir Project.
(2) Note by the Chief Engineer of Mysore, dated 8th May 1911.
(3) Letter No. 8 Camp, dated the 1st July 1911, from the Dewan of Mysore, to the Resident in Mysore.

Letter No. 27—Pol., dated Bangalore, the 8th July 1911, from T. Ananda Rao, Esq., C.I.E., Dewan of Mysore, to the Hon'ble Lieut.-Col. H. Daly, C.S.I., C.I.E., Resident in Mysore.

I have the honour to acknowledge the receipt of your letter No. 3900, dated the 3rd July 1911, forwarding, for the consideration of His Highness' Government, a copy of a note, dated the 12th May 1911, by Sir John Benton, K.C.I.E., Inspector-General of Irrigation in India.

2. The note of the Inspector-General of Irrigation is dated the 12th May 1911, and is based on data and information at his disposal before the complete connected papers on the Mysore Cauvery Reservoir Project were submitted.

The following papers comprising the complete project were supplied to the Residency in May last :—

(1) Printed reports and plans of the Cauvery Reservoir Project in Mysore.

(2) Printed note, dated the 8th May 1911, on the effect of the proposed Mysore Cauvery Reservoir on existing irrigation in British territory.

There has also been demi-official correspondence between the Madras and Mysore officers with a view to arrive at a working basis; but the receipt of Sir John Benton's proposals has modified the situation and the Madras Government have informed us through the Residency that they are unable to give any definite reply without the advice of the Government of India.

We therefore now look to the Government of India for an immediate solution of the difficulty.

3. The two reports mentioned in paragraph 2 above will give all the latest information, the lack of which is referred to in Sir John Benton's note.

Further details are also available in manuscript and will be furnished if required.

These papers will enable the Inspector-General of Irrigation to view the question from the standpoint of the most recent proposals of the Durbar.

4. In interpreting the Agreement of 1892, the Inspector-General of Irrigation assumes in paragraph 5 of his note that the proposed Kannambadi Reservoir is *below* Ramaswami anicut. As may be seen from plate I in the printed report, the site is actually about 16 miles *above* that anicut.

5. The Durbar have perused with great interest the very able note by Sir John Benton.

Two points stand out foremost in the conclusions he has formed before the complete Mysore project was before him; and these are—

(1) that in his opinion the Mysore storage reservoir will interfere with existing irrigation in the Madras Presidency; and

(2) that it is desirable to provide additional storage room in the Mysore reservoir to the extent of 13,203 millions cubic feet to obviate shortage of supply, and to the extent of 17,770 millions cubic feet as an allowance for silt and margin of safety—making a total extra storage of 30,973 millions cubic feet.

6. As regards the first point, the Inspector-General of Irrigation has apparently accepted in their entirety the conclusions of Colonel Ellis, Special Superintending Engineer, Madras Cauvery Project.

Colonel Ellis has based his calculations on the discharges at the Bhavani bridge instead of those at the "Cauvery Dam." The Durbar do not see any reason why the calculation should be so made.

The Madras Engineers, as stated in my last letter No. 4, *Political, dated the 1st July 1911, at one time considered a limit of 6 feet on gauge at the Cauvery Dam as the standard for delta irrigation. At present a limit of 7 feet is insisted on. By common consent this 7 feet is the utmost that Madras can claim. The whole question turns on this 7 feet limit.

*Camp No. 8.

In the Mysore note, dated the 8th May 1911, it has been shown that there would be enough water available for the Mysore reservoir even with the 7 feet limit (*vide* paragraph 10 of that note). The statement, if found true after verification, should be accepted as conclusive in favour of the Mysore scheme. Every other question is beside the point.

If the view on this point is accepted, His Highness' Government feel sure that the Government of India will at once authorize the Durbar to proceed with the construction of the reservoir.

7. With regard to the second point raised in the Inspector-General's note, the opinion of the Durbar is as follows:—

(1) The shortage of 13,203 millions cubic feet is based on Colonel Ellis' calculations. But, as explained in paragraph 5 above, the printed figures in the Madras project show that there is really no shortage.

(2) As regards the silt difficulty, reference is invited to paragraph 53 of the Chief Engineer's printed report on the Mysore project. The Inspector-General's estimate of silt is based on the provision necessary at the proposed Madras Cauvery

Dam at Metur. At the Mysore or Kannambadi site the quantity will be much smaller. The late Captain Dawes calculated after an elaborate analysis of the water (extract from his report is enclosed for information) that the silt which would be deposited in the reservoir might amount to less than 16 millions cubic feet per annum. At this rate the reservoir will take *2,500* years to silt up.

Besides, as will be seen from the longitudinal section of the dam (*vide* printed report), a large number of undersluices are provided as in the Assouan Dam and the Bhatgar Dam (Nira canal) in the Bombay Presidency.

The quantity of silt in our reservoir will be very small compared to what the Inspector-General of Irrigation expects at the Metur Dam with four times its drainage area. With the large number of undersluices which will be working throughout the monsoon keeping the lower strata of water constantly on the move, no separate provision for silt space will be needed.

I am informed that the Bhatgar Reservoir referred to above, which is the second largest reservoir in India, has been practically free from silt on account of the provision of such undersluices. Our Chief Engineer, who at one time was in charge of that reservoir for nearly five years, informs me that silt has been kept out of that reservoir to a very material extent by the undersluices.

Although not needed, we have already a provision of 4,400 millions cubic feet for silt deposit below the sluices. Considering that the intended provision in the Madras reservoir is 10,000 millions cubic feet, the waste space already left by us should be sufficient as our reservoir is only half the size of that of Madras. Taken along with the undersluices, further provision is entirely superfluous.

It will be seen that we can do without raising the reservoir and we have no doubt that, when the foregoing facts are placed before him, the Inspector-General of Irrigation will agree with us.

8. Not only is it not necessary, but the increase of storage cannot be effected for two reasons. One is that the full supply level of the present reservoir has been determined so as to avoid the submersion of the taluk town of Yedatore besides other valuable villages and lands. The level is already as high as can be permitted without swamping that town.

Our second difficulty is the great cost of the proposal as it practically involves doubling our storage. The corresponding cost in the first stage, on account of the increased section, will be absolutely prohibitive.

These are two formidable difficulties which there is no getting over. If the Government of India insist upon raising the dam, it will practically lead to the abandonment of proposals upon which so much time, money and anxiety have been already spent by His Highness' Government.

9. Calculated supplies apart, there will be many occasions during actual rainfall when the Madras Government will not require the river supply and will therefore be in a position to spare some of it for our use, whether the gauge reading be 7 feet or less.

If all the conclusions and opinions go against the scheme, the worst that can happen will be that, in three years out of every twenty, there may be shortage of supply in Mysore.

In such an eventuality, the Durbar will take steps to curtail their hot weather irrigation in the affected years. But the power supply will not be interfered with in any event.

The risk is not great because, in the very worst year, even according to Colonel Ellis' figures, the reservoir will fill two-thirds full.

If, from the data now available, the Madras Government feel unable to reduce the 7 feet limit, the Durbar are willing to accept that limit in the monsoon months, *provisionally for a period of six years*, subject to reduction by mutual consent after further observation and study of the river discharges.

10. If the main principles are first accepted and ratified by the Government of India, the preparation of draft rules for storing water without trenching on Madras needs can be easily arranged.

11. The discussions on this question for the past seven months having proceeded on shifting ground have not advanced the subject to any appreciable extent. For instance, the Durbar understood that the Madras officers wanted us to build a smaller reservoir. The Inspector-General of Irrigation now favours a much larger one. Unless the Government of India are pleased to take the matter into their special consideration, the Durbar despair of an early settlement. Messrs. John Taylor & Sons, the representatives of the Kolar Gold Mines, have cabled from London last week that the delay in the settlement of this question is having serious consequences on the mining industry, and they have practically given us an ultimatum to the effect that, unless we commence a storage reservoir at once, they will be obliged to put up their own steam plant for generating the extra supply of electric power which they require. This will mean the complete abandonment of our reservoir scheme as we depend mainly on the gold mines market to make the reservoir a financial success.

12. I earnestly request that, with the full information now before them, the Government of India will be pleased not to withhold sanction to our proceeding with the first stage of the scheme, as already applied for in paragraph 10 of my letter No. 869, Political, dated the 27th March last. The Durbar make this appeal with the full confidence that the Government of India will decide the question on the higher ground of the welfare of Mysore in whose prosperity, as paramount power, they are as much interested as in that of the neighbouring Province of Madras.

SUB-ENCLOSURES.

Extract from a Note, dated the 25th April 1908, by the late Captain Bernard Dawes, R. E., lately Deputy Chief Engineer, Public Works Department, Mysore, on the disposal of silt in the Cauvery Reservoir.

The results of tests of water in the river Cauvery taken during the months of July, August, September and October of last year are as follows:—

Test samples	Suspended solids number of grains per gallon	State of flood in river
(1) Taken on 23rd July 1907. This sample was taken under faulty conditions.	1·4 per gallon ...	25 per cent below normal.
(2) Taken on 7th August 1907. From samples of which two were taken at Wellesley Bridge—		
(*a*) 10 feet above bed level	5·6 do ...	.....
(*b*) 2 feet do	8·4 do ...	.....
Two were taken at dam site—		
(*c*) 6 feet above bed	4·2 do ...	200 per cent above normal.
(*d*) 2 do	4·2 do ...	.....
(3) Taken on 24th August 1907. One foot above bed level flood. Seven feet at dam site.	5·6 do ...	.....
(4) (*a*) Taken on 7th September 1907. At dam site one foot above bed level flood. Six feet above bed level.	25·2 do ...	20 per cent below normal.
(5) (*b*) Taken on 22nd September 1907. From the Cauvery river at dam site one foot above bed of river flood. Six feet above bed.	7·0 do ...	.....
(6) Taken on 9th October 1907. At dam site one foot above bed level flood. Five feet above bed.	5·6 do ...	10 per cent below normal.

Of the above tests, No. 1, I consider faulty, as the water was taken from the top of the river and at the bank. I therefore leave it out of my calculations.

Of the others, No. 4 (*a*) disagrees with the rest and there was no reason for a high proportion of silt as the flow in the river was below the normal in a month when the normal discharge is less than two-fifths of the normal discharge in the month of maximum discharge.

I think there is no doubt the water must have been stirred up. In any case this particular quantity does not very greatly affect the total as the supply in that month was small.

The tests of greatest value are those taken in August, and of those it will be seen that the samples taken at Wellesley Bridge, where the river passes through an alluvial country, are considerably higher than those taken at the dam site; and further the fact of the flood being at a maximum has not greatly increased the proportion of silt.

However, in this particular case, the taking of samples in the river at the dam site cannot have been a very easy operation and I propose to take the higher results obtained at the Wellesley Bridge, Seringapatam, as more accurately expressing the actual state of affairs.

From the tests taken on 24th August 1907, it will be seen that the proportion of suspended solids had decreased while at the same time the flood in the river had decreased.

The Wellesley Bridge test samples were taken in a bottle attached to a rod and let down against a pier in the middle of the river, the bottle being attached at the height specified. It was let down corked and the cork was extracted when the end of the rod touched the bottom.

The lower dam site test samples were taken in a similar manner but out of a coracle instead of being taken from the pier of a bridge. I think it is quite safe to take 7·5 grains per gallon as the average proportion of silt, particularly as these results represented the condition of the river in a year of unusual flood. Now the normal flood in the river is 220,000 millions of cubic feet per annum at the site of dam. And with the above proportion the amount of silt to be cleared in the river is 15·35 millions of cubic feet per annum or ·81 million of tons per year or, to be on the safe side, say 1 million tons per annum.

Letter No.—Camp 8-Pol. 4, dated the 1st July 1911, from T. Ananda Rao, Esq., C.I.E., Dewan of Mysore, to the Hon'ble Colonel H. Daly, C.S.I., C.I.E., Resident in Mysore.

In continuation of my letter Pol. No. 869, dated the 27th March 1911, I have the honour to forward herewith copy of a cablegram received on the 29th June 1911 from Messrs. John Taylor & Sons, London, on the subject of the Cauvery Reservoir. The firm state that further "delay would cause serious consequences" and unless some final decision is given by 5th July, they will have to take other measures into consideration.

2. Although we have been in communication with the Madras Government for over seven months past and although every endeavour has been made to induce them to come to an agreement, there has been hesitation and delay on their part. In their latest communication, we are informed "that they are unable to give a definite reply to the proposals therein made until they have ascertained the views of the Government of India who have been consulted."

3. The original argument of the Madras Government was that, for two or three years out of every twenty, our reservoir might not fill consistently with the maintenance of a full supply to existing irrigation in the Cauvery delta. According to the opinion of Mr. Larminie, a former Chief Engineer of the Madras Government, a discharge in the river measuring up to 6 feet on the gauge at the Cauvery anicut would answer the requirements of the delta irrigation. Later advisers of the Madras Government have taught that 7 feet is desirable. On an examination of the printed reports on the Madras project, the record of gauge readings shows

that the Mysore Reservoir would not have failed to fill, in any of the first twenty years, even under the hard condition of a 7 feet limit. The fact that, while objecting to a reservoir of 37,000 millions cubic feet in Mysore, the Madras Government propose to construct one of double the size themselves immediately below Mysore territory, is sufficient proof that their objections are not of serious import. Their fear seems to be that our reservoir will to some extent curtail the supply to the new reservoir proposed by them, and thus interfere with the supply for fresh and additional irrigation.

4. If a new reservoir is constructed by the Madras Government, the delta irrigation can be carried on with much less waste than at present, and the obligations of the Mysore Government not to interfere with the river supply will practically cease.

Everything possible has been done to meet the views of the Madras Government. Since they first put forward their objections, our irrigation demands have been reduced and we have placed on ourselves further restrictions in the matter of direct irrigation from the river.

The Mysore Government are satisfied that the construction of their reservoir will not in the least interfere with existing irrigation in the Madras Presidency. It is with this conviction that I address this letter for favour of your immediate action in the matter.

5. The sanctions required are specified in paragraph 10 of my letter under reference. If the settlement is to be left to correspondence, we apprehend interminable delays. The only prompt way of deciding the question would be to ask the officers who understand it to meet and come to an agreement as suggested already in paragraph 11 of my letter.

The Durbar on their part are prepared to depute two of their officers for the purpose, *viz.*, Mr. R. H. Campbell, I.C.S., Private Secretary to His Highness the Maharaja, and the Chief Engineer of our Public Works Department.

6. Any urgent steps you may take to this end will be esteemed a great obligation. I venture to hope that, after consulting the Government of India by telegram, you will be so kind as to suggest what reply we are to return to the message from Messrs. John Taylor & Sons, London.

Cablegram dated the 28th June 1911, from Messrs. John Taylor & Sons, London, to the Chief Engineer, Mysore Government, Bangalore.

Referring Committee's interview twentieth June much regret not hearing further from Government as delay would cause serious consequences to Mines. Feel Government will realize no alternative to installation by Companies of Diesel plant unless offer made twenty-first December acccepted forthwith. Beg favour prompt cable reply. Special meeting convened July fifth to settle Diesel scheme.

Note on the effect of the proposed Mysore Cauvery Reservoir on existing Irrigation in British Territory, dated 8th May 1911.

In their demi-official No. 2555, dated the 27th April 1911, the Residency have asked to be furnished with the following information concerning the Cauvery Reservoir Project in Mysore:—

(1) Full details of the design of the proposed reservoir.

(2) Design and scope of the irrigation system.

(3) Rules for working the irrigation system so as to show the prospective effect of the scheme on existing irrigation in British territory.

2. As regards item (1), a printed compilation comprising the reports and papers on the project is separately submitted.

As regards item (2), complete information is available concerning the reservoir in two stages. But the design and scope of the irrigation system are not yet definitely determined. The necessary surveys are in progress.

As regards the rules for working the irrigation system (item 3), I propose to discuss in this note the restrictions contemplated by the Madras Government in regard to the storing and use of the river water in Mysore territory and to submit definite recommendations in the matter.

Information received from the Madras Government.

3. In December last, the Mysore Government were favoured with two notes on the subject, one written by the Hon'ble Mr. C. A. Smith, till recently Chief Engineer for Irrigation, Madras, and the other by Colonel W. M. Ellis, R. E., Superintending Engineer on Special Duty. They were received with demi-official letter R. O. C. No. 386-1—10, dated the 6th December last, from the Joint Secretary to the Government of Madras, to the Hon'ble the Resident in Mysore.

A copy of the printed report in three volumes on the Madras Cauvery Reservoir Project was received from the Residency on the 28th April 1911.

Supply required under Mysore Reservoir Project.

4. The Mysore Government propose to construct a reservoir with a masonry dam having an ultimate storage capacity of 41,500 millions cubic feet, of which 37,100 will be available for use. It is not proposed to construct this large reservoir all at once. A beginning will be made by constructing a dam so as to store 80 feet of water above river bed equivalent to a capacity of 11,000 millions cubic feet. This storage will be utilised to protect the existing power supply to the Kolar Gold Fields and also to give an additional supply up to 5,000 H. P. The water-supply to the existing channels below the dam will be improved. For further details, reference is invited to the report on the project. Although some portion of the stored water will be used for power generation between March and May when it will not be useful to Madras, the bulk of it so used for the rest of the year will be distinctly beneficial to Madras irrigation. At present a steady flow of 500 cusecs is maintained in the river in summer by artificial means without any cost to the Madras Government. This steady supply will be at least doubled under the new proposals. The papers show that, when the scheme is fully developed, the total quantity of water proposed to be abstracted for irrigation will be 37,300 millions cubic feet or less than 40,000 millions cubic feet. The quantity required for use in Mysore, as originally intimated to the Madras Government in a former communication from Mysore, was 51,162 millions cubic feet—*vide* note by the Superintending Engineer on Special Duty, Madras, dated the 15th November 1910.

Effect of Mysore storage on the river supply.

5. According to the tables given in the printed reports of the Madras project—

	M. C. FT.
(1) The average discharge for eight months of the irrigation season at the head of the delta in the 20 years ended 1909-1910 was ...	425,555
(2) The average quantity actually sent down for irrigation into the delta in this period was	294,084
(3) The quantity which was surplused or wasted at the Cauvery anicut was	131,471

The quantity passed down at the head of the delta irrigation is known, but there is no record of what portion of it was actually used for irrigation. Mysore proposes to store less than one-third of what was actually surplused at the anicut.

Claims of Mysore to the surplus supply.

6. In his letter No. 869, Political, dated 27th March 1911, to the address of the Hon'ble the Resident, the Dewan of Mysore has drawn attention to the relative extent of irrigation practised in the Madras Presidency and in Mysore. The area in Madras is 1,005,000 acres and that in Mysore only 108,000 acres. The latter is less than one-ninth of the former, while, admittedly, nearly three-fourths of the discharge obtained in the Madras Presidency is derived through Mysore. The first claim to all surplus water therefore belongs to Mysore.

7. The Madras Government propose to construct a reservoir close to the Mysore boundary capable of storing 80,000 millions cubic feet or more than double the effective storge contemplated in the Mysore project. They also propose to extend their present irrigation by 355,000 acres. According to Colonel Ellis' note, the storage obtainable at Metur (the site selected for their reservoir) in bad years is, if anything, less than that discharged at Sivasamudram within Mysore territory.

What Madras Government propose to do for themselves.

In the arrangements for regulating the supply for their use, the Madras Engineers propose to utilise 190,050 millions cubic feet instead of the average of 294,014 millions cubic feet passed down into the delta during the past 20 years. This leaves a surplus of 235,505 millions cubic feet available for storage in Mysore or Madras. The quantity required in Mysore will be about one-sixth of this surplus.

8. The Hon'ble Mr. C. A. Smith entertains doubts as to the ability of the Mysore Government to control the supply of water for irrigation during seasons of scarcity. So far as this project is concerned, I see no objection to guarantee that not more than 40,000 millions cubic feet will be utilised in any year for irrigation within Mysore territory so long as the existing conditions continue. The discharges may be calculated at the head of the one or two canals that may be constructed, and all measures necessary be taken to maintain correct records of discharges to the satisfaction of the Madras Government.

Proposals of the Chief Engineer for Irrigation, Madras, as regards irrigation in Mysore.

It is proposed to hold 2,000 to 3,000 millions cubic feet in reserve always to provide against a failure of power supply. Besides, there will be storms in April and May, almost every year, which will bring in a substantial replenishment.

9. Colonel Ellis wishes to make sure that the quantity abstracted in Mysore is strictly within the quantity which is surplused at the Cauvery Dam at the head of the delta.

Proposals of Colonel Ellis, Special Superintending Engineer.

His suggestions to this end are—

(1) that during periods when the discharge at the Cauvery Dam is less than 7 feet on the gauge there, no abstraction should be allowed in Mysore;

(2) that the equivalent of 7 feet discharge on the Cauvery Dam should be passed down the river at the Sivasamudram Anicut within Mysore territory; and

(3) that gauges should be established above and below the Mysore reservoir for the accurate measurement of the volumes impounded from day to day.

These points may be dealt with as follows:—

The suggestion recommended in (3) may be accepted.

The Sivasamudram Anicut cannot be accepted for the measurement of the discharges, beceause there is a large area of catchment which brings appreciable supplies during the north-east monsoon, below Sivasamudram.

As regards suggestion (1), the limit of 7 feet on gauge seems a hard condition. In the table given below, it will be seen that the average depth corresponding to the *maximum* fortnightly discharges (column 3) has not exceeded 7 feet in seven months out of eight; in December and January, for instance, a depth of 7 feet is rarely or never reached.

The Madras Government have suggested certain heights in connection with the working of their own project, but they cannot be expected to consent to give the benefit of similar regulation to Mysore until their storage reservoir is constructed. Till then, a compromise may be effected and the figures given in column 5 of the

following table adopted as the future limit of discharge for the purpose of impounding in Mysore :—

Months.	Average depths corresponding to average fortnightly discharge.	Average depths corresponding to maximum fortnightly discharge.	Average depths now proposed by Madras in connection with their new project	Limit of depths above which impounding may be allowed as now proposed.
1	2	3	4	5
	Feet	Feet	Feet	Feet
June	2·1	4·5	2·9	4·5
	4·5	5·5	2·9	4·5
July	4·8	6·5	6·1	6·1
	5·6	6·8	6·1	6·1
August	5·6	7·9	5·9	6·1
	5·0	6·2	5·9	6·1
September	4·5	5·2	5·8	5·5
	4·0	5·4	4·7	5·5
October	4·4	5·6	5·0	5.5
	4·4	5·2	4·2	5·5
November	4·0	5·4	3·8	5·5
	3·1	5.2	3·8	5·5
December	2·4	4·85	·0	5·5
	2·0	4·0	1·7	4.0
January (First half)	2·1	3·7	2.1	4·0

This table is based on figures given on pages 34 and 207—212 of Vol. III of "Papers regarding the Madras Cauvery Reservoir Project."

Conclusions which stand out clear.

10. From the interchange of views that has taken place between the two Governments, the following points may be considered as settled. The admirable tables given in the Madras Reservoir Project show clearly to what extent the river has been used for irrigation in the delta during the past twenty years.

(1) Between March and May, and probably also in the second half of February, the entire supply of the river belongs to Mysore and no restrictions are necessary for this period.

(2) The usual period of storage will be from the middle of June to the end of August. There will be additional supply from the hot weather storms to count upon before this period, and from the north-east monsoon after this period. Usually the Mysore reservoir can be filled by the 31st July. In these circumstances the chances of Mysore reservoir failing are very remote.

The Madras tables show that during the twenty years ended 1909-1910 the supply was deficient in six years. But, in those six years, according to the tables given on pages 208 to 212 of Vol. III of the report on the Madras project, the surplus after allowing for the "irrigation supply" limit of 7 feet on the Cauvery dam was as follows:—

Year	M.C.FT.
1890-91	83,987
1894-95	47,605
1899-00	46,545
1904-05	112,969
1905-06	64,708
1908-09	125,613

Even without lowering the 7 feet limit, there was enough surplus in all these years to fill the Kannambadi reservoir.

(3) When a reservoir is also constructed in Madras, the regulation at the Cauvery dam can be arranged to a nicety. The average surplus supply then

available would be sufficient for both the reservoirs. If there is any deficiency in very bad years, Mysore should have the first claim as already explained in paragraph 6 above.

11. Now that the requirements of both the Governments are fully known, the way to the solution of the problem is clear. The following suggestions may be put forward for the consideration and approval of the Madras Government :—

Recommendations.

(1) If the Madras Government still entertain any fears that Mysore may use excess water unauthorisedly in times of drought for the protection of dry crops, an assurance may be given that the quantities issued to the canal or canals will be strictly limited to the totals agreed upon. This condition may be given effect to also by providing surplus escapes or weirs, if necessary. The Mysore Government may undertake to submit to any reasonable restrictions which the Madras Government may consider it necessary to impose in order to satisfy themselves that nothing beyond the stipulated quantity is withdrawn in any year. If this is accepted, no other restrictions in connection with impounding should be insisted on.

(2) If the proposals in (1) be not acceptable, the Durbar may agree to a modified form of the suggestions of Colonel Ellis as an alternative.

Correct quantities of the supply admitted into the reservoir and thence passed down into the river should be maintained from hour to hour, or day to day as required.

Mysore may go on impounding for a week or fortnight at a time, and at the end of each period, the quantities impounded may be compared with those which would have surplused at the Cauvery Dam. The difference, if any, in favour of Madras, may be returned to the river within a week from the end of the period.

The gauge readings at the Cauvery Dam for the purpose of this calculation should be those indicated in column 5 of table given in paragraph 9 above.

(3) When Madras constructs a reservoir, the limit of gauge reading should be those which the Madras Engineers have suggested in connection with their own reservoir—*vide* column 4 of table noted above.

The art of river gauging is yet imperfect, particularly when applied to flood discharges. With the growth of years, gauging will improve in accuracy both in Mysore and Madras.

When the existing conditions undergo changes for any reason, the restrictions which Mysore at present undertake to submit to should be correspondingly relaxed.

12. The suggestion of Colonel Ellis that Mysore should store whenever there is a surplus flow at Sivasamudram after allowing the equivalent of 7 feet discharge at the Cauvery Dam cannot be accepted for reasons already explained in paragraph 9 *ante*.

The correct way of impounding is with reference to the gauge at the Cauvery Dam itself. But a flood at Kannambadi will take place several days before the corresponding one at the Cauvery Dam. The interval will depend on the intensity of the flood. It is therefore proposed to store continuously at Kannambadi and to adjust the difference at the end of a week or fortnight.

To facilitate impounding in Mysore without inconvenience to Madras, Mysore may lend up to 10,000 millions cubic feet from its own reservoir, if required, until the reservoir is filled, or till 31st August, provided Mysore is allowed *unconditionally* to recoup itself to that extent from whatever flow there may be in the river after the latter date.

13. It is harassing and unusual for one State to control the interna. distribution of water within another to the extent proposed by the Madras Government. This will probably be the first time that a control of this sort is sought to be exercised in any Native State in India.

The fact that the Madras Government have proposed an extension of irrigation by means of a reservoir of double the size contemplated in Mysore is itself sufficient proof that the Madras Government have no misgivings as to the Mysore reservoir filling without trenching on the requirements of the deltaic irrigation. Nearly the

whole of the supply which they propose to impound will be obtained from Mysore and not from Madras territory; and yet the Madras Government object to storage within Mysore limits.

If there can be any objection to the construction of a reservoir, it is applicable to both proposals; and as the Madras reservoir is to be twice the size of ours, the objection must apply with greater force to the Madras proposal.

14. As there can be no manner of objection to the small reservoir which forms the first stage with a capacity of only 11,000 millions cubic feet, the Madras Government may be moved to accord the necessary permission to enable Mysore to commence work at once.

Further interchange of views may be necessary in respect of the larger reservoir if the proposals, made in paragraph 11 above, do not commend themselves to the Madras Government. But the foregoing review of the case clearly shows that no insuperable difficulties exist to interfere with an early and satisfactory settlement of the question.

BANGALORE,
8th May 1911.

M. VISVESVARAYA, M.I.C.E.,
Chief Engineer, Mysore P. W. Dept.

(ii)

Letter No. 1824-I.B, dated Simla, the 25th August 1911, from the Deputy Secretary to the Government of India in the Foreign Department, to the Hon'ble Lieut.-Colonel H. Daly, C.S.I., C.I.E., Resident in Mysore.

I am directed to refer to your letter No. 4038, dated the 8th July 1911, submitting a further representation from the Mysore Durbar in regard to the proposed construction of a reservoir on the Cauvery river.

2. I am to say that the Government of India have carefully considered the representation of the Mysore Durbar and fully sympathise with their anxiety to arrive at a speedy decision with regard to their reservoir scheme. They have no desire to press the acceptance of any proposals on the Durbar; but they regret that, on the information at present before them, they are not satisfied that the proposals of the Durbar can be accepted without the risk of prejudicing seriously existing irrigation interests in Madras. Nor are they satisfied that the Government of Madras have yet been provided with all the information that was required to enable them to express a final opinion on the Durbar's proposals. For instance, they do not appear to have been furnished with necessary details regarding the working of the proposed Mysore reservoir and irrigation scheme, and it is only quite recently that they have been supplied with any copies of the report on the Cauvery Reservoir Project, although that report is said to supersede some of the reports which were previously supplied to the Madras Government. Nor does there appear to have been any discussion with the Madras Government on the proposal that the Mysore Durbar should be permitted to proceed at once with the construction of the smaller reservoir of 11,000 millions cubic feet capacity.

3. I am to ask that the questions at issue may now be fully discussed between the Government of Madras and the Mysore Durbar and submitted to the Government of India for consideration. If, as the Government of India hope will be the case, both parties come to an agreement in the matter, the proposals may be forwarded to the Government of India for confirmation. In the event, however, of its being found impossible to arrive at a mutual settlement, I am to ask that the arguments on both sides, together with complete copies of the papers in support of them, may be referred to the Government of India for orders.

4. Finally, I am to enclose for the information of the Mysore Durbar copy of a further note by the Inspector-General of Irrigation, dated the 28th July 1911.

SUB-ENCLOSURES.

Note on the proposed Mysore Cauvery Reservoir by Sir John Benton, F.C.H., K.C.I.E., Inspector-General of Irrigation in India, dated 28th July 1911.

Correspondence.—Since the issue of my note of 12th May 1911 copies of the following have been received by the Government of India:—

A. Report on the Mysore Cauvery Reservoir Project.

B. The Dewan's letter Camp No. 4, Political No. 8, dated 1st July 1911.

C. The Dewan's letter Political No. 27, dated 7th July 1911, with note, dated 8th May 1911, by the Chief Engineer of Mysore.

2. The Madras Government has not yet dealt with any of the above, and it appears essential that the Government of India should procure their opinion on the Mysore proposals. The Mysore Government desires that the Government of India should at once pronounce on the case, and I wish to offer the following comments on the above correspondence.

A.—REPORT ON THE MYSORE CAUVERY RESERVOIR PROJECT.

3. *Preparation of working tables.*—This report does not show very definitely the supply of water proposed to be drawn off in each half month for irrigation and for power, and how it is proposed to operate the reservoir. These data were asked for by the Madras Government months ago and any additional particulars required should be furnished to Madras as soon as possible.

B.—DEWAN'S LETTER NO. 8-4, DATED 1ST JULY 1911.

4. *Provisional remarks.*—Pending receipt of the opinion of the local Government, I can only venture to offer some provisional remarks. The paragraph numbers below are those of the Dewan's letter:—

(i) *Paragraph 1.*—The proposals with regard to the Mysore reservoir have not been shown to meet the requirements of existing irrigation in Madras, and also those of the Mysore State.

(ii) *Paragraph 2.*—It appears to me that the procedure should have been—to adopt as the bases conditions which meet the requirements of pre-existing irrigation in Madras, to have these accepted by the Government of that Presidency, and to then prepare complete working tables of the reservoir for the last twenty years, on the supposition that the work was then in existence. This was for the Mysore State to carry out, or failing this, that they should furnish the requisite data to the Madras Government.

(iii) *Paragraph 3.*—The Upper Anicut crest wall, and also the gauge zero which is at the level of the same were lowered 4 feet in 1899-1902 (*vide* report on the Madras Reservoir Project, Volume I, paragraphs 12, 35 and 56; Volume III, Part I, paragraph 2, Part II, paragraphs 11, 13 and 20). The 6 feet gauge referred to by Mr. Larminie was the old one at the high level. The larger the reservoirs, the greater the power for conserving floods. The Madras Government has never advanced any claims for the proposed extensions of irrigation, and their actual procedure is a safer subject for comment than supposed motives which can be refuted by that Government.

(iv) *Paragraph 4.*—The Madras Reservoir will only serve the wants of that Presidency; I would suggest that it is for the Mysore Government to construct a reservoir of adequate capacity not to deprive existing Madras irrigation of the supply which it has enjoyed from time immemorial. The omission referred to in sub-paragraph (ii) above appears to me to have caused most of the delay.

(v) *Paragraph 5.*—What is required appears to be—acceptance by the Mysore authorities of principles shown from past working to be necessary to safeguard existing Madras rights, and the preparation of complete working tables for the same—*vide* sub-paragraph (ii) above. Nothing has been detailed which can be settled by verbal discussion; there has already, I understand, been a lengthy verbal discussion in Madras between the Chief Engineers of Madras and Mysore.

C.—DEWAN'S LETTER NO. 27, DATED 7TH JULY 1911.

5. *Provisional remarks.*—The statements made in this letter appear to me to call for the following remarks:—

(i) *Paragraph 2.*—It is essential in my opinion that the Government of India should have the opinion of the Madras Government.

(ii) *Paragraph 4.*—The map furnished does not show Ramaswamy Anicut. Acceptance of the correction in no way affects the case since the Agreement of 1892 requires that the approval of the Madras Government should be procured prior to the construction of any new irrigation reservoir across "any part" of the Cauvery.

(iii) *Paragraph 6.*—Paragraph 3 (iii) above will explain the misconception about the 6 feet gauge reading. The sufficiency of the Cauvery supplies has not been questioned,—provided that adequate storage is provided in the Mysore reservoir for carrying forward the surpluses of floods to meet the shortages of periods of low supplies. The proposed Mysore reservoir should be shown to be large enough to meet this requirement, by preparing fully detailed working tables for the last 20 years, as Colonel Ellis did for the data previously furnished by the Mysore State.

(iv) (*a*) *Paragraph 7.*—The data now furnished by the Mysore State differ slightly from those for which Colonel Ellis prepared working tables of the Mysore reservoir; shortages of capacity will, I fear, still result when the new data are adopted. In my opinion the procedure should be to prepare *fully detailed revised working tables* for the data now advanced.

(*b*) The data with regard to silt are not as full as could be desired; but as the dam could not be raised to give greater capacity, and thus compensate for initial shortage by under-estimating of silt deposits, it is apparently essential to make a liberal allowance for silt in the first instance. The experiments of the late Captain Dawes were apparently on a very small scale, and the results—being rather inconsistent with each other—are inconclusive. The proportion of silt to water by volume which he proposed for acceptance was 7·5 grains per gallon. There are 6·2355 gallons in a cubic foot, 5,760 grains in a pound, and we may assume that the weight of silt is 112 lb. per cubic foot. This gives for the volume of silt in one cubic foot of water:—

$$\frac{6{\cdot}2355 \times 7{\cdot}5}{5760 \times 112} = \frac{1}{13{,}794} \text{ of a cubic foot.}$$

It may be observed that this proportion is unprecedentedly small for such a case—the usual proportions being from 1/500 to 1/3000; further, no allowance was made for the silt rolled along the bed—which may be as much more,—and which would make the proportion 1/6897. The side valleys are steep, the surface is largely composed of soil liable to erosion, and the conditions do not indicate that the proportion of silt should be unusually small.

(*c*) The Madras experiments were carried out far more thoroughly, and on a very much larger scale—*vide* Volume III, pages 197-203 of the report on the Cauvery Reservoir Project. The proportion of silt in solution to water by volume was 128·2 to 4312310; hence the following:—

1-3370 for the silt in solution.

1-1685 for the total silt carried, assuming that the quantity rolled along the bed was as much as that held in solution.

Hence the comparative figures are as follows for all the silt carried:—

Mysore experiments, 1-6897 for Kannambadi site.

Madras experiments, 1-1615 for Metur site.

(*d*) The effect of the undersluices may first be considered. It is asserted that the six sluices of 6′ × 12′ at 12 feet above bed will scour out the silt, and Bhatgar reservoir is cited as a parallel case; with regard to these views I would point out as follows:—

I. RESERVOIR LEVEL BELOW CANAL OFF-TAKE LEVEL AND RIVER SUPPLY USED FOR SCOURING.

If at all feasible,—which appears unlikely,—this could only be carried out at the beginning of the flood season; but, with the future supply from the river uncertain, no part of it could be devoted to scouring, and it would be necessary to at

once store water and hold it up for irrigation and power purposes. If it is considered that any scouring through the undersluices could be carried out, this expenditure of water should be shown in the working tables, and should also find a place in the working rules.

II. River maintained at canal off-take level.

The proposed canal off-take is 60 above river bed, and the cross-sectional area at that height is 448,800 sq. ft. The flood discharge at the Kannambadi site is given as follows—*vide* page 9, Mysore Project—

	M. C. FT.
Maximum	250,000
Average	220,000

The mean velocity upstream of the dam on the supposition that all the water in floods is passed through the sluices, which is far too favourable an assumption, would be—

from 250,000/448,800	= 0·56 of a foot per second
to 220,000/448,800	= 0·49 „ „

Since a velocity of 2′ to 3′ would be required for scouring, no removal of silt would be effected under this condition.

III. Water level in reservoir above canal off-take level and scouring carried out in floods.

No scouring could possibly occur as the velocities would be less than those arrived at in the case II above.

The Mysore reservoir is in no way similarly circumstanced to the one at Bhatgar, since there is no high level canal taking out at the site of the latter, while the undersluices are more numerous, and the water-supply so abundant that in the driest years two-thirds of it can be used for scouring. As far as at present informed, it appears to me that removal of any silt by scouring through the undersluices may be regarded as impossible under the conditions of the Mysore work; this result is in accordance with actual experience of works elsewhere which are really similarly circumstanced.

(*e*) The Mysore reservoir will apparently trap all the silt reaching it; the amount deposited will depend solely on the turbidity, and on the quantity of water passed through. The average discharge is given as 220,000 millions cubic feet. For the reasons given in sub-paragraphs (*b*), to (*d*), the provision required for silt deposits for 100 years may be taken to be as follows:—

	M. C. FT.
In one year $\frac{220{,}000}{1685}$ m. c. ft.	= 130·6
In 100 years	=13,060
Deduct provision for silt in present design ...	= 4,400
Extra provision for silt for 100 years	= 8,660
To meet shortage in dry years—*vide* note of 12th May 1911 ...	=13,203
Total extra capacity	=21,863
Capacity as per project	=41,500
Total capacity	=63,363

The total capacity as given in the Chief Engineer's note of 15th October 1910 was as follows:—

	M. C. FT.
Below R. L. 2404	... 4,480
Above R. L. 2404	...39,270
Total	...43,750

The capacity as given in the report on the Mysore Project estimate is 41,500 or 2,250 millions cubic feet less than the 43,750 detailed above. I am not aware of the cause of this reduction; it is possible that the data on which Colonel Ellis arrived at the shortage of 13,203 millions cubic feet may also be affected, and if so, this would necessitate modification of the 13,203 and also of the 63,363 arrived at above.

Revised working tables are essential to show what extra capacity is required.

(v) *Paragraph* 8.—The map furnished does not show the levels about Yedatore, and these are required to complete the case. The figures given under sub-paragraph (iv) (*e*) above point to about 63,360 millions cubic feet sufficing instead of the 72,473 millions cubic feet arrived at in my note of 12th May 1911 on the incomplete data then available; this reduction of 9,110 millions cubic feet is due to the revised data furnished in the Project estimate received after issue of my note just mentioned. As already stated, revised working tables for the new Mysore data may serve to admit of still further reductions. It is hoped that raising the dam to give the finally amended capacity may not present any insuperable difficulties. The reservoir as now proposed would be one-fourth of a mile from Yedatore. The damage to existing irrigation in the delta from a curtailment of the water-supplies of the past to suit a Mysore reservoir of inadequate capacity would be a far more costly and serious matter than facing compensation and extra cost of construction of a higher dam, while it is due to the existing cultivators that their water-supply should not be reduced.

If the proposed Mysore undertakings were Madras Government works, I would be quite unable to advise Government of India to better the revenues of the former at the expense of the pre-existing rights of irrigation in the delta.

(vi) *Paragraph* 9.—(*a*) The rainfall is too uncertain to admit of any forecasts of it being relied on, more especially as regards rice cultivations—*vide* paragraph 14 of my note, dated 12th May 1911.

(*b*) A shortage of supply in three years out of twenty years would very seriously prejudice existing rights of the irrigators in the delta, and arrangements must clearly be devised under which this cannot possibly occur.

(*c*) The provisional proposal to only accept the 7 feet gauge at the Upper anicut for six years would in no way meet requirements. Inspection of Appendix VIII of column 5 of my note of 12th May 1911 will show that a shortage of 13,203 occurred only once in 20 years. The six-year period might not inculde any such dry year, and would not show whether the 7 feet gauge condition could be relaxed. I would advise that the requisite extra capacity may be an essential condition, and that the period for trial may be twenty instead of nine years, my reasons being that a year with a shortage of 13,023 millions cubic feet as in 1906-1907 may occur when the results would be depriving Mysore cultivators of over 52,000 acres of irrigation; this is over one-third of the total 150,000 acres proposed to be irrigated on the new canals, and would give rise to intolerable hardship, not to mention the scandal of favouring the power and mining royalties at the expense of the means of subsistence of the cultivators. The shortage in supply would be the result of inadequate capacity being given to the Mysore reservoir, but the case would appear to those unacquainted with conditions as one of Government of India reducing Mysore irrigation to furnish water to the delta; this position would be unfair to Government of India, since inadequacy of capacity would be the true explanation. The warrantable discontent of the Mysore cultivators promises to be a serious objection and it is obviously a result to carefully avoid.

(vii) *Paragraph 11.*—The case has been chiefly delayed—

(1) by the reluctance of the Mysore State to accept and act on conditions which are essential for safeguarding the existing rights of the cultivators in the Madras delta.

(2) by their not preparing working tables for these conditions which will clearly show that the arrangements will answer the requirements of both Governments.

(viii) *Paragraph 12.*—Before the masonry dam can be commenced, the ultimate height of it requires to be known since the width at the base depends on the height :—

(*a*) To proceed with a dam intended to reach 124 feet ultimately, and which may only be carried up to a height of 94 feet for the storage of 11,000 millions cubic feet would involve a waste of Rs. 14½ lakhs—*vide* Mysore Reservoir report, page 5, paragraph 27.

(*b*) To proceed with a dam intended to be only built up to 124 feet would not admit of the work being raised to provide for the extra storage referred to in paragraph 4 (*e*) above.

(*c*) To pronounce on the case without the opinion of the Madras Government,—who are as much interested as Mysore State,—would be to give a decision after hearing only one side of the case, and which promises to be regretted hereafter.

Note by the Chief Engineer, Mysore, dated 8th May 1911.—I wish to suggest as follows with regard to what is stated in this note :—

(i) *Paragraph 9.*—Colonel Ellis' conditions have the recommendations of meeting Madras rights and of being simple; this officer was apparently of opinion that the inflow below Sivasamudram in crucial times would not be a disturbing factor which could not be allowed for, while no statistics have now been, or probably can be, advanced in support of the supposition that this will not be the case. Referring to sub-paragraph (2) of the Chief Engineer's letter, the addition of the words "less net increase in the river discharge between Mysore and Upper Anicut" are required to make the condition both fair and definite; and I trust means can be found for giving effect to this modification when there will be no need to make any further departures from the simple rules proposed by the Madras Government. This is a local question which had better be dealt with by the Madras officers in the first instance. The figures advanced in the table are based on averages and normal gauge readings which promise to lead us far away from the Madras requirements. Madras is due and requires a 7-feet gauge reading at the Upper Anicut when obtainable, and in my opinion any proposal which ignores this fundamental necessity must prejudice existing Madras rights.

(ii) *Paragraph 10.*—As will be seen from my note of 12th May 1911, paragraph 23 (ii), only a moiety of the surpluses quoted were available for the Mysore reservoir,—if that work is given a capacity of only 41,500 millions cubic feet. To make these surpluses available, an enlarged capacity is essential and I have advocated this being given. It is obviously incorrect to assume that flood surpluses which have passed into the ocean months previously,—owing to lack of adequate storage to conserve them,—are available for use either in Mysore or Madras. The proposed Madras reservoir is only given the capacity needed for Madras requirements; as far as Mysore is concerned, this work has no connection whatever with the case now under consideration. This provision of the requisite storage to meet Mysore requirements devolves, I would suggest, on the Government of that State.

(iii) *Paragraph 11.*—It is needless to consider the proposals advanced in this paragraph which pre-suppose that the Madras rights will be met by rules based on the system of average figures referred to in sub-paragraph (i) *supra* which cannot be accepted.

(iv) *Paragraph 12.*—The proposals made in this paragraph are for the consideration of the Madras Government. It appears to me that it is perfectly impossible to clearly see the effect of any such proposal without preparing fully detailed working tables for the last twenty years,—and it is for the Mysore Government to prepare these if they wish to show that this alternative will answer.

(v) (*a*) The Government of India abandoned the Sutlej-Montgomery project after it had been fully prepared, and chiefly out of deference to the merely prospective requirements and rights of Native States further down that river, while in this case actually established rights protected by special agreement are what have to be safe-guarded; there have been other more or less similar cases of restrictions elsewhere, but it is needless to enter on these matters since the Agreement of 1892 has to be complied with. The proposals of the Chief Engineer, Mysore, may prove

more troublesome than those advanced by the Madras Government; but neither would be harassing if loyally worked to, since in this case distribution of supply would rest with Mysore as long as the conditions were complied with.

(*b*) The Cauvery river supply consists of a series of floods as fully explained in my note of 12th May 1911, paragraph 12, and the large size proposed for the Madras reservoir was dictated by this consideration; the size of this reservoir should be no grievance, since it is a question quite apart from that now under consideration, while the enlargement of the proposed Mysore reservoir has been pressed on the Mysore Government in my note just mentioned. For compliance with the existing agreement and safeguarding of existing rights, the Mysore reservoir should either be small enough to not prejudice these rights - which involves restrictions on State proposals – or it should be sufficiently large to fully meet the requirements of existing Madras rights as well as all the proposed new works in Mysore. The relative sizes of proposed Mysore and Madras reservoirs have no bearing on the case at issue except that works of small capacity are quite unsuitable in both cases. I may remark, as already pointed out in my note, dated 12th May 1911, paragraph 23, with regard to the Dewan's letter Political, dated 27th March 1911, paragraph 8, that the ordinary requirements of the Madras reservoir are 60,000 millions cubic feet, while it is to be given a gross capacity of 90,000 millions cubic capacity or 50 per cent more to provide for dry years, floods and silt. In the case of the Mysore reservoir the ordinary requirements may be presumed to be the project capacity of 41,500 millions cubic capacity; if this is increased to 63,363 millions cubic capacity as advised in paragraph 4 (*e*) above for precisely the same reasons, the percentage of increase will be 53 per cent or almost exactly the same as in the case of the Madras work. The conditions as regards uses to which the water is to be put are entirely different, and the closeness of these percentages is admittedly a matter of chance coincidence; however, this will serve to show that the scale of capacity as recommended here is practically the same in both cases.

(vi) *Paragraph 14.*—The suggestions of the Chief Engineer to move the Madras Government to accord the necessary permission to proceed with the small reservoir of 11,000 millions cubic capacity is a very practical one which calls for careful consideration. The Chief Engineer does not explain what base width is to be given to the masonry dam, but the difficulties enumerated in paragraph 4 (viii) above present themselves, if the proposal is to make it suitable for a dam of an ultimate height of 124 feet over bed as proposed in the project. The Chief Engineer of Mysore has not furnished any detailed working table showing that when the Madras conditions—*vide* paragraph 9 of his note with the amendments 6 (i) above - are accepted, a work of 11,000 millions cubic feet storage capacity will suit Mysore requirements. Before agreeing to this proposal it appears to me that the following should be ascertained:—

(*a*) Whether working tables for a Mysore reservoir of about 11,000 millions cubic feet capacity based on the Madras conditions – *vide* paragraph 9 of the Mysore Chief Engineer's note—will meet Mysore requirements.

(*b*) Whether the Madras Government are prepared to approve of this proposal; it is believed that they will not accept it unless this is agreed on by the Mysore Government to be the ultimate capacity, which would mean that the base width of the dam should only be made of suitable width for a maximum height of 94 feet over river-bed.

(*c*) Whether the Mysore Government agree to the work being as described in the Mysore Cauvery Report, paragraph 27, with a maximum storage capacity of 11,000 millions cubic feet.

6. *Conclusion.*—I would recommend as follows:—

(i) That copies of the papers mentioned in paragraph 1 above along with copies of my note of 12th May 1911 may be sent to the Madras Government for report.

(ii) That the measures necessary for the protection of Madras interests as proposed by that Government may be accepted, or that and amendments of same may be agreed to by Madras—*vide* paragraph 6 (i) above.

(iii) That the working conditions of the proposed Mysore reservoir and irrigation scheme may be clearly laid down and agreed to by the Governments of

Madras and Mysore. The proposed working rules were asked from the Mysore Government by the Government of Madras some months ago, but they do not appear to have been furnished in a very definite form up to now.

(iv) That fully detailed working tables for the Mysore reservoir, such as advanced by Colonel Ellis, may be prepared for the conditions (iii) above and for the following two cases:—

(*a*) For a reservoir of sufficient capacity to comply with the conditions (ii) above, while fully meeting Mysore requirements.

(*b*) For a reservoir restricted to 11,000 millions cubic feet as the ultimate capacity.

The Madras Government will, I trust, be willing to prepare these working tables provided that they are furnished with the requisite additional data which may be found to be necessary—*vide* paragraph 3 above.

Order No. 296--I., dated 18th September 1911.

The following letter will be sent to the Secretary to the Government of India, Public Works Department.

[Here enter letter No. 297—I., dated 18th September 1911]

(True Extract.)

H. E. CLERK,
Joint Secretary to Government, P. W. D.,
Irrigation Branch.

Exhibit Ma. 9-a.

Information asked for by the Arbitration.

"Population affected by irrigation below the Upper Anicut."

The population of the villages irrigated by the Cauvery Delta and Lower Anicut Systems is 2,200,000 excluding Karikal, which is French Territory.

The figures have been taken from the 1911 Census Report.

W. M. ELLIS, COL., R.E.,
Representative of the Govt. of Madras.

25th October 1913.

Appendix I.

(i)

Rules for the guidance of the Superintendent, Upper Coleroon Anicut.

I. Except after periods of scarcity, the sluices of North and South Branches will be opened when water rises to 6·5 feet on the Cauvery Dam gauge.

II. The sluices of the South Branch will be closed when water falls to 6·0 feet on the Cauvery Dam gauge and those of the North Branch when water falls to crest level.

III. After a period of scarcity, that is, when during the previous week the water level has not exceeded 6·0 feet at the Cauvery Dam, the sluices of both branches will not be opened until water rises to 7·0 feet on the Cauvery Dam gauge.

IV. In opening the sluices the Superintendent should begin with the middle ones, and in closing, with the end ones.

In the South Branch, numbering the sluices from the south end, the following will be the order for opening them: 4, 3, 5, 2, 6, 1, 7; and for closing, the reverse order: 7, 1, 6, 2, 5, 3, 4. Numbering similarly the vents in the North Branch, they will be opened in the order 4, 5, 3, 6, 2, 7, 1, 8; and closed in the order 8, 1, 7, 2, 6, 3, 5, 4.

Note.—The Cauvery Dam gauge to which levels are referred is the enamelled iron gauge at the north end of dam.

J. Beatty, Col., R. E.,
Superintending Engineer, VI Circle.

27th July 1882.

Approved by the Chief Engineer for Irrigation in Memorandum No. VI—2-T.J., dated 19th February 1882.

(ii)

Rules for Regulation at the Upper Anicut.

The under-sluices never to be opened, except on orders, before the Cauvery Dam gauge-reading falls below 7 feet.

2. On a rising flood, under-sluices not to be opened till the Cauvery Dam gauge reads 7 feet.

3. On a falling flood, under sluices to be gradually closed so as to keep 8·0 feet on the Cauvery Dam gauge for as many days as possible.

4. In the case of heavy rain in the Trichinopoly basin draining into the Cauvery below the Cauvery Dam and when an express is received from a recognized authority, all the under-sluices of Upper Anicut to be opened.

5. In opening the sluices, the Superintendent should begin with middle ones, and in closing with end ones. In the South Branch, numbering the sluice from the South end, the following will be the order for opening them: 4, 5, 3, 6, 2, 7, 1; and for closing, the reverse order: 7, 1, 6, 2, 5, 3, 4. Numbering similarly in the North Branch, they will be opened in the order, 4, 5 and 3, 6 and 2, 7 and 1, 8 and closed in the order 8, 1, 7, 2, 6, 3, 5, 4.

Note.—The Cauvery Dam gauge to which levels are referred to is the enamelled iron gauge at north end.

A. W. Smart, Lieut.-Col., R.E.,
Superintending Engineer on special duty.

6th May 1896.

(iii)

Rules for the Regulation of water at different heads in the Tanjore Division.

AGANDA CAUVERY.

Upper Anicut.

The under-sluices never to be opened except on orders while the Cauvery Dam gauge-reading is below 7 feet.

2. On a rising flood, under-sluices not to be opened till the Cauvery Dam gauge reads 7 feet.

3. On a falling flood, under-sluices to be gradually closed, so as to keep 8 feet on the Cauvery Dam gauge for as many days as possible.

In case of heavy rain in the Trichinopoly basin draining into the Cauvery below the Cauvery Dam and when an express is received from a recognized authority, all the under-sluices of the Upper Anicut to be opened.

In opening the sluices, the Superintendents should begin with the middle ones, and in closing with the end ones. In the South Branch, numbering the sluices from the South end, the following will be the order for opening them: 4, 5, 3, 6, 2, 7, 1; numbering similarly in the North Branch, they will be opened in the order 4, 5 and 3, 6 and 2, 7 and 1, 8, and closed in the order 7, 1, 6, 2, 5, 3, 4 and 8, 1, 7, 2, 6, 3, 5, 4, respectively. The Cauvery Dam gauge to which levels are referred 2 is the enamelled iron gauge at the north end.

Printed in the year 1899.

(iv)

Rules for the Regulation of Water at different heads in the Tanjore Division.

AGUNDA CAUVERY.

Upper Anicut.

The under-sluices never to be opened, except on orders, while the Cauvery Dam gauge-reading is below 7 feet.

2. On a rising flood, under-sluices not to be opened till Cauvery Dam gauge reads 7 feet.

3. On a falling flood, under-sluices to be gradually closed so as to keep 8 feet on the Cauvery Dam gauge for as many days as possible.

In case of heavy rain in the Trichinopoly basin draining into the Cauvery below the Cauvery Dam and when express is received from recognized authority, all the under-sluices of the Upper Anicut to be opened.

In opening the sluices, the Superintendent should begin with the middle ones, and in closing with the end ones. In the South Branch, numbering the sluices from the south end, the following will be the order for opening them: 4, 5, 3, 6, 2, 7, 1; numbering similarly in the North Branch, they will be opened in the order 4, 5 and 3, 6. and 2, 7 and 1, 8 and closed in the order 7, 1, 6, 2, 5, 3, 4 and 8, 1, 7, 2, 6, 3, 5, 4, respectively. The Cauvery Dam gauge to which levels are referred is the enamelled iron gauge at the north end.

H. H. O'CONNELL,

20th January 1902. *Executive Engineer, Tanjore Division.*

(v)

Rules for Regulation at Upper Anicut.

The following rules are for the guidance of the Sub-Divisional Officer and the Superintendent.

They may only be departed from by the Executive Engineer, Tanjore, who may regulate the Cauvery and the Coleroon at his discretion in the case of breaches or threatened breaches or other abnormal contingencies in the delta.

In cases of great emergency, the Tanjore Sub-Divisional Officer may use his discretion but must report the circumstances and his action to the Executive Engineer with the least possible delay.

1. The normal supply level for the delta is 7·0 feet on Cauvery Dam north gauge, and this level should be maintained as long as possible by raising or lowering the anicut shutters.

2. Should water tend to rise above 7·0 feet on the Cauvery Dam with the anicut shutters raised 6 feet, the latter should be raised clear.

3. Should water tend to fall below 7·0 feet on the Cauvery Dam, the shutters should be lowered so as to maintain 7·0 feet.

4. Should water fall below 7·0 feet on the Cauvery Dam with the shutter closed, leakage should be prevented as far as possible by means of clay and straw.

5. Should a message be received from the Grand Anicut Superintendent that water is rising there above normal supply level and the Upper Anicut shutters are not raised clear, he should at once raise them clear even though by so doing water may fall below 7·0 feet on the Cauvery Dam.

(*Note.*—This rule is necessary to provide for local rainfall causing drainage into the Cauvery below the dam).

6. On receipt of a message from the Grand Anicut Superintendent that water there has fallen again to normal supply level, the Upper Anicut Superintendent should at once lower the shutters so as to maintain 7·0 feet on the Cauvery Dam.

7. All sets of shutters should ordinarily be regulated by raising or lowering them uniformly, the height of opening being invariably recorded. Should it be impossible or inadvisable under certain circumstances to keep the openings uniform, the varying heights should be accurately recorded.

8. Water should on no account be allowed to overtop the shutters.

TANJORE DIVISIONAL OFFICE,
19*th May* 1905.

A. H. MORIN,
Executive Engineer.

Approved by the Chief Engineer for Irrigation in his No. 1932, dated 19th June 1905.

(vi)

Rules for Regulation observed at the Lower Anicut prior to remodelling in 1899-1900.

Whenever water rises to 1·5 feet over crest of Coleroon Anicut in North Branch, all undersluices of both the branches are opened, and when water has fallen to 1 foot over the crest all sluices are closed.

The full supply allowed on rear gauges of head sluice of Lower Anicut during irrigation season when there is no rain, is 6 feet for North and South Rajan voikals and 8 feet for the Vadavar and the Kumukimanniar.

(vii)

Revised Rules for the Regulation of Water at different heads in the Tanjore Division, Lower Coleroon Anicut.

1. In no case is water to be allowed to pass over the top of the shutter.

2. When floods come down, the shutters to be kept closed until the water rises to within an inch of the top of the shutter. If the floods still rise, all the shutters to be raised alike and raised gradually until there is 7 feet on the sill of the Anicut; the shutters should then be raised or lowered so as to maintain 7 feet on the sill. If the flood continues to rise after the shutters have been lifted 7

feet, the shutters may be lifted clear of the water as long as flood is above 7 feet on the sill of the anicut.

3. When the flood falls, the shutters to be lowered so as to maintain 7 feet on the sill of the anicut.

4. The under-sluices shutters will be worked when there is a cushion of 2 feet on the lower apron.

5. Whenever the water, with all the shutters closed, falls below the top of the shutters, the North Rajan voikal shall be closed two days a week. If the water falls one foot or more below crest level, then the South Rajan voikal shall also be closed for the same two days that the North Rajan voikal is closed. In both cases water shall not be allowed to rise and go over the shutters.

6. Whenever water falls below the top of shutters, every effort should be made to stop leakage by plugging with clay and straw.

H. H. O'CONNELL,
Executive Engineer, Tanjore Division.

2nd December 1904.

(viii)

Rules for the Regulation of Water now in force at the Lower Anicut.

1. In no case is water to be allowed to overtop the shutters.

2. When freshes come down the river, the shutters will be kept closed until water rises to the top. Should water continue to rise, the shutters will ordinarily be so regulated as to maintain a front reading of 7 feet.

3 Should, however, the Executive Engineer, South Arcot, or the Sub-Divisional Officer, Chidambaram, intimate to the Superintendent that more than 7 feet is required, the shutters, etc., may be so regulated as to maintain a front reading of not more than 8½ feet, according to the requirements of the Vadavar.

4. In carrying out rules 2 and 3, the five shutters adjacent to the North and South Rajan channels, respectively, will be raised more than the others, with a view to keeping the heads of those channels clear of sand.

5. Should water tend to rise above the required front reading, the ten shutters referred to in rule 4 will first be raised clear, and if this does not have the effect of reducing water to the required reading, the under-sluices will then be opened.

6. Should water still continue to rise above the required reading, the remaining shutters will be regulated accordingly. They will finally be raised clear as soon as the unobstructed flow gives the required reading or more.

7. Whenever the front gauge reads 13 feet, 14 feet and 15 feet, respectively, the Superintendent will intimate the fact to the Superintendent, Grand Anicut, by telephone, stating in each case whether water is rising, falling or steady.

8. When water finally begins to fall after a flood, the same procedure as that laid down for a rising flood will be followed, but in the reverse order.

9. Should water fall to 2 feet below top of shutters, all shutters and under-sluices being closed, the North Rajan head-sluice may, on the requisition of the Executive Engineer, South Arcot, or the Sub-Divisional Officer, Chidambaram, be closed from 6 A.M. on Sunday to 6 A.M. on Tuesday, for the benefit of the Vadavar. In order that the Vadavar may get the full benefit of this *morai*, the South Rajan head-sluice and the Kumukimanniar will, as soon as the North Rajan head-sluice is closed, be so regulated as to give the same rear reading as there may have been immediately before the commencement of the morai. Athough this reading may fall during the 48 hours' turn, the South Rajan and Kumukimanniar head-sluice must not be regulated again during that period.

10. Should water fall to 3 feet or more below top of shutters, the South Rajan and Kumukimanniar head-sluice will be closed from 6 A.M. on Sunday to 6 A.M. on Tuesday for the benefit of the Vadavar. The North Rajan shall also be closed during the same period unless the Executive Engineer specially requires it to be opened. Should water tend to overtop the anicut shutters during this period,

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it will be kept down by slightly opening the North and South Rajan and Kumukimanniar head-sluices equally.

11. Throughout the short supply season, leakage under the anicut shutters should be prevented as far as possible by means of clay and straw.

12. In order to get rid of abnormal shoals above the anicut, any of the shutters may be worked as scouring sluices at the discretion of the Mayavaram Sub-Divisional Officer.

Approved in G. O. No. 184-1, dated 3rd May 1909.

(ix).

Rules for the Distribution of Water for Irrigation.

CAUVERY AND VENNAR REGULATORS.

1. A full and ample supply to the delta is considered to be passing when there is a discharge of 11,240 cubic feet per second into the Cauvery and 6,104 cubic feet per second into the Vennar.

2. When there are no local floods in the delta, the Vennar regulator is to be kept open as long as water does not rise to above 7·0 feet on front gauge and the shutters of the Cauvery regulator adjusted so as to give proportionate discharges to the two rivers according to the following table:—

Cauvery			Vennar	
Cubic yards per hour per acre	Total discharge Cubic feet per second		Cubic yards per hour per acre	Total discharge Cubic feet per second
4	15,000	...	$2\frac{2}{3}$	8,140
3	11,240	...	2	6,104
$2\frac{1}{2}$	9,370	...	$1\frac{2}{3}$	5,080
2	7,492	...	$1\frac{1}{3}$	4,070
$1\frac{1}{2}$	5,620	...	1	3,052
1	3,746	...	$\frac{2}{3}$	2,030
$\frac{1}{2}$	1,873	...	$\frac{1}{3}$	1,015

Note—.The intermediate readings to be interpolated.

3. When water reaching the regulators is more than will give the discharges stated in rule 2, water will be admitted into the Cauvery up to 7·0 on rear gauge.

4. If water still continues to rise, it will be passed into the Vennar until the rear gauge reads 8·0 feet, unless the Superintendent has received information that the Vennar is in danger from local drainage, in which case the water should be reduced to 6·5 feet. On orders from the Executive Engineer, the Vennar regulators may be closed entirely.

5. If water in front of the regulators rises above the level required to give gauge depths stated in rules 3 and 4, 7·5 may be admitted to the Cauvery; and if the rise continues, the shutters of the Cauvery regulators must be raised so that the difference of level in front and rear shall not exceed $4\frac{1}{2}$ feet.

26th September 1892.

Approved in Chief Engineer for Irrigation's Memorandum No. V/3-T. J., dated 11th January 1893.

(x)

Rules for Regulation of Water at Grand Anicut.

CAUVERY AND VENNAR REGULATORS.

1. If water rises above 7 feet on front gauge, open Cauvery shutters till rear gauge of Cauvery reads 6·2. Cauvery and Vennar shutters will now be fully open.

2. If water still rises, keep on opening both regulators exceeding, with no exception, 9·4 feet on Vennar rear gauge or 6·5 feet on the Pillai gauge and as a rule 7·5 feet on Cauvery rear gauge.

3. But if the water still continues to rise, let water down the Cauvery, taking care that the difference of front and rear levels of water does not exceed 4½ feet.

4. If you see heavy rain in the south-east of Grand Anicut, reduce rear gauge of Vennar to 6·5. Reduce still further when you receive reports that Vennar is in danger from local drainage.

5. If the cross bank at Vennar old head breaches, act according to former printed rules.

J. C. JOHNSTON,
Executive Engineer.

2nd August 1894.

Approved in Chief Engineer for Irrigation's Memorandum No. V—80-T. J., dated 28th August 1894.

(xi)

Rules for the Regulation of Water at different heads in the Tanjore Division.

CAUVERY.

CAUVERY-VENNAR REGULATORS.

Regulation of water during floods.

1. During floods the safe limit to which water may be allowed to rise on rear gauge of Cauvery is 7·5 and of Vennar is 9·0.

2. When front gauge of Vennar is 8·3 and rear gauge 8·0 and Cauvery at or about 4·5 on rear gauge, and river rising, open out Cauvery until rear gauge reads 6·2

3. If the water is still rising, begin to open the under-sluices. If, after the under-sluices are fully opened, there is still further rise, open out both Vennar and Cauvery sufficiently to give 7·5 on rear gauge of Cauvery and 9·0 on rear gauge of Vennar.

4. If the rivers still continues to rise, begin to lift the Grand Anicut shutters. The shutters to be all lifted evenly, 2 or 3 inches at a time, and to be gradually fully lifted as the flood rises.

5. When the rear gauges of the Cauvery and Vennar begin to fall below 7·5 and 9·0 respectively, then begin to lower the lift shutters gradually and evenly for the whole length of anicut.

6. When the lift shutters are fully closed and rear gauges of Cauvery and Vennar still falling, begin to close the under-sluices gradually.

7. If their is heavy rain to the south-east of Grand Anicut, the Superintendent will reduce the rear gauge of Vennar to 6·5 on his own initiative; but, if he receives information from the Superintendent of Vennar-Vettar head that there is danger below, he may reduce the rear gauge to 4·0, provided the difference between front and rear gauges of Vennar regulator is not more than 6 feet.

8. If the Cauvery banks are in danger during high floods, the rear gauge of the Cauvery will be reduced, on orders received from the Executive Engineer, provided that the difference between the front and rear gauges of the Cauvery is not more than 6 feet.

Regulation in non-flood season.

On Monday and Tuesday full supply will be sent down the Cauvery, and what surplus there is will be sent down the Vennar. On Wednesday and Thursday full supply will be sent down the Vennar, and what surplus there is will be sent down the Cauvery. On Friday, Saturday and Sunday the water will be sent down the Vennar and Cauvery proportionately.

2. Full supply in the Cauvery is 4·5 feet on rear gauge and full supply in the Vennar is 8 feet on rear gauge.

H. H. O'CONNELL,
Executive Engineer, Tanjore Division.

20th January 1902.

(xii)

CAUVERY-VENNAR REGULATORS.

Rules for Regulation during floods.

1. The Anicut Superintendent will, in the absence of any requisitions from the Executive Engineers, Tanjore and Negapatam, regulate the water so as to maintain 7 feet on the rear gauge of Vennar and 4·5 feet on the rear gauge of the Cauvery.

2. Should the Anicut Superintendent notice heavy rain to the south-east in the basin of the Vennar, he will at once lower the rear gauge of the Vennar to 6 feet without waiting for orders.

3. Should he receive requisition from the Executive Engineer, Tanjore or Negapatam, to alter the depth of water on the rear gauges of the Cauvery or Vennar, he will promptly carry out these requisitions *as long as the front gauge of the lower Anicut is below* 13 *feet.* After receiving intimation that the front gauge of Lower Anicut reads 13 feet, he will cease to comply with such requisitions and maintain 7 feet on the rear gauge of the Vennar and 4·5 feet or more on the rear gauge of the Cauvery.

4. Should water rise in front of the regulators, he will regulate the shutters so as to maintain 7 feet in Vennar and 4·5 feet in Cauvery or whatever the Executive Engineers of Tanjore and Negapatam have asked for, and open first the under-sluices and then the Grand Anicut shutters so as to reduce the height of water in front of the regulators to give the necessary head to maintain the above depths in the Cauvery and Vennar.

5. Should water go on rising, he will go on lifting the Grand Anicut shutters until there is 4 feet on the crest of the Grand Anicut when he will lift the shutters clear and keep them clear as long as water rises. Should water fall below 4 feet on crest, he will again lower the shutters and regulate the water as laid down in rule 4 and, if necessary, again close the under-sluice shutters.

6. If the water, instead of falling as indicated in rule 5, still continue to rise, he will leave the Grand Anicut and under-sluice shutters fully open and gradually open the Cauvery shutters so as to keep the depth of water in rear of the Cauvery regulator just 6 feet below the depth in front.

N.B.—The maximum on rear gauge of Cauvery is not to exceed 7·5 feet.

7. When the Superintendent receives intimation from the Lower Anicut that water has risen to 13 feet on front gauge, he will raise water in the Cauvery to 6 feet.

8. If further intimation is received that water has risen to 14 feet, he will raise water in the Cauvery to 7·5 feet.

9. If further intimation is received that the water has risen to 15 feet, he will open the Vennar regulator and raise water to 9 feet on the Vennar rear gauge.

10. He must maintain this condition of things until he hears that water has sunk to below 15 feet on front gauge of Lower Anicut when he will reduce Vennar to 7 feet. On hearing that water has fallen below 14 feet at Lower Anicut, he will reduce the Cauvery to 6 feet, and when the water at Lower Anicut has fallen to 13 feet he will regulate the Cauvery so as to keep it 6 feet below the water in front.

11. When the water has fallen to below 13 feet at Lower Anicut, he will regulate again as laid down in rules 1, 2, 3, 4 and 5.

Regulation during low supply.

The present *morai* will be adhered to until further orders, *viz.*,

Full supply to Vennar for two days and full supply to Cauvery for two days and a proportionate supply to the Cauvery and Vennar for three days, the proportion being 3 to Cauvery and 2 to Vennar.

A. H. MORIN,

June 1905. *Executive Engineer, Tanjore Division.*

Approved in Chief Engineer for Irrigation's Memorandum No. 1931, dated 19th June 1905.

(xiii)

Rules for Regulation of water at Cauvery-Vennar Regulators.

Regulation during floods.

1. The Anicut Superintendent will, in the absence of any requisitions from the Executive Engineers, Cauvery and Vennar, regulate the water so as to maintain 7 feet on the rear gauge of Vennar and 4·5 feet on the rear gauge of the Cauvery.

2. Should the Anicut Superintendent notice heavy rain to the south-east in the basin of the Vennar, he will at once lower the rear gauge of the Vennar to 6 feet without waiting for orders.

3. Should he receive requisition from the Executive Engineers, Cauvery or Vennar, to alter the depth of water on the rear gauge of the Cauvey or Vennar, he will promptly carry out these requisitions *as long as the front gauge of the Lower Anicut is below 13 feet*. After receiving intimation that the front gauge of the Lower Anicut reads 13 feet, he will cease to comply with such requisitions and maintain 7 feet on the rear gauge of the Vennar and 4·5 feet or more on the rear gauge of the Cauvery.

4. Should water rise in front of the regulators, he will regulate the shutters so as to maintain 7 feet in Vennar and 4·5 feet in Cauvery or whatever the Executive Engineers, Cauvery and Vennar, may have asked for, and open first the under-sluices and then the Grand Anicut shutters so as to reduce the height of water in front of the regulators to give the necessary head to maintain the above depths in the Cauvery and Vennar.

5. Should water go on rising, he will go on lifting Grand Anicut shutters until there is 4 feet on the crest of the Grand Anicut when he will lift the shutters clear and keep them clear as long as water rises. Should water fall below 4 feet on crest, he will again lower the shutters and regulate the water as laid down in rule 4 and, if necessary, again close the under-sluice shutters.

6. If the water, instead of falling as indicated in rule 5, still continue to rise, he will leave the Grand Anicut and under-sluice shutters fully open and gradually open the Cauvery shutters so as to keep the depth of water in rear of the Cauvery regulator just 6 feet below the depth in front.

N.B.—The maximum or rear gauge of Cauvery is not to exceed 7·5 feet.

7. When the Superintendent receives intimation from the Lower Anicut that water has risen to 13 feet on front gauge, he will raise water in the Cauvery to 6 feet.

8. If further intimation is received that water has risen to 14 feet, he will raise water in the Cauvery to 7·5 feet.

9. If further intimation is received that the water has risen to 15 feet, he will open the Vennar regulator and raise water to 9 feet on the Vennar rear gauge.

10. He must maintain this condition until he hears that water has fallen to below 15 feet on front gauge of the Lower Anicut when he will reduce Vennar to 7 feet. On hearing that water has fallen below 14 feet at Lower Anicut, he will reduce the Cauvery to 6 feet, and when the water at Lower Anicut has fallen to 13 feet he will regulate the Cauvery so as to keep it 6 feet below the water in front.

11. When the water has fallen to below 13 feet at Lower Anicut, he will regulate again as laid down in rules 1, 2, 3, 4 and 5.

Regulation during low supply.

12. As soon as water falls below full supply in both rivers, regulation shall be made in the proportion of 3 to Cauvery and 2 to Vennar, the proportion being determined by the tables of calculated discharges furnished to the Superintendent by the Executive Engineer.

13. The Executive Engineer, Cauvery Division, with the concurrence of the Executive Engineer, Vennar Division, may order that a weekly *morai* may be introduced when supply is low, provided that such order shall in no circumstances be given till the water in both rivers has fallen below two-thirds normal full supply.

S. D. PEARS,
Superintending Engineer, V. Circle.

Approved in Chief Engineer for Irrigation's Memorandum No. 1542, dated 30th April 1909.

Appendix II.

Table showing occasions of carrying water in Cauvery and Vennar at depth exceeding full supply stated in the rules.

The Cauvery.

Year and month	Total number of days, when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5 feet		
1	2	3	4	5	6	7	8	9
1900.								
June	4	...	2	1	1	4	...	4
July	31	2	10	4	15	31	...	31
August	28	3	...	2	19	24	1	23
September	14	3	6	3	2	14	...	14
October	6	...	3	...	3	6	...	6
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
1901.								
June	3	1	1	...	1	3	...	3
July	20	1	11	2	3	17	...	17
August	13	2	9	...	...	11	...	11
September	4	...	...	1	1	2	...	2
October	19	1	1	3	2	7	...	7
November	10	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1900.											
June	7	...	...	2	...	5	...	...	7	.....	7
July	31	...	...	...	...	16	4	11	31	.....	31
August	31	...	...	1	...	1	3	26	31	.....	31
September	20	1	1	1	2	8	3	...	16	.....	16
October	13	2	2	1	1	7	...	...	13	.....	13
November	1	...	...	...	...	1	...	...	1	.....	1
December	...	...	...	...	...	...	...	..	...	.....	...
1901.											
June	7	...	1	1	..	5	...	...	7	.....	7
July	22	...	1	...	...	15	3	3	22	.....	22
August	26	2	1	1	...	22	...	...	26	.....	26
September	4	1	...	...	2	...	...	...	3	.....	3
October	21	...	1	1	...	5	2	...	9	.....	9
November	12	...	...	...	...	...	...	...	...	.....	...
December	...	...	...	...	...	...	...	...	...	.....	...

Appendix II—*contd.*

Table showing occasions of carrying water in Cauvery and Vennar at depth exceeding full supply stated in the rules—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over 4·5 practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, cols. 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1902.								
June	...	...	...	...	...	...	...	...
July	17	1	2	4	6	13	2	11
August	2	1	1	...	...	2	...	2
September	18	2	4	4	2	12	...	12
October	14	...	...	1	2	3	...	3
November	11	...	...	...	...	...	...	...
December	14	...	...	...	...	...	...	...
1903.								
June	...	...	...	...	...	...	...	...
July	16	...	..	1	15	16	..	16
August	30	...	9	2	7	18	3	15
September	24	...	...	...	...	...	...	...
October	24	2	10	2	...	14	..	14
November	15	1	5	1	2	9	3	6
December	12	...	...	...	...	...	...	...

The Vennar.

Year and month	Total number of days, when passing over 7 feet practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for Irrigation only, cols, 7—8
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1902.											
June	1	...	...	...	...	1	...	...	1	...	1
July	21	1	1	1	1	12	4	...	20	1	19
August	7	1	1	...	1	4	...	...	7	...	7
September	17	...	..	1	2	5	1	...	9	...	9
October	10	1	1	1	...	...	...	...	3	...	3
November	1	...	...	...	...	...	...	...	...	...	...
December	9	...	...	...	...	...	...	...	...	...	...
1903.											
June	...	...	...	...	...	...	...	...	...	...	Nil
July	16	..	1	...	...	4	7	4	16	Nil	16
August	16	...	4	...	...	1	1	2	8	1	7
September	8	...	...	...	...	...	...	...	...	...	Nil
October	14	...	...	...	...	...	...	...	...	...	...
November	12	...	1	...	...	...	...	...	1	1	...
December	12	...	...	...	...	...	...	...	...	...	...

Appendix II—*contd.*

Table showing occasions of carrying water in Cauvery and Vennar at depth exceeding full supply stated in the rules—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for Irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1904.								
June	12	2	4	...	...	6	...	6
July	28	3	6	8	6	23	...	23
August	14	2	2	3	...	7	...	7
September	5	...	4	1	...	5	...	5
October	4	2	1	...	...	3	...	3
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
1905.								
June	1	1	...	...	...	1	...	1
July	18	...	5	1	1	7	...	7
August	7	...	6	...	1	7	...	7
September	6	1	...	...	...	1	...	1
October	9	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for Irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1904.											
June	13	1	2	...	...	...	...	...	3	...	3
July	23	...	4	3	1	...	...	...	8	...	8
August	14	...	1	...	...	5	...	...	6	...	6
September	2	...	1	1	...	...	...	...	2	...	2
October	1	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...
1905.											
June	...	...	...	...	...	...	...	...	...	...	...
July	17	...	1	...	...	...	...	...	1	...	1
August	4	...	...	...	1	1	...	...	2	...	2
September	9	...	...	...	...	...	...	...	...	...	...
October	8	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...

Appendix II—*contd.*

Table showing occasions of carrying water in Cauvery and Vennar at depth exceeding full supply stated in the rule—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over 4·5 practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	
1906.								
June	...	...	...	...	...	...	...	...
July	8	4	...	...	...	4	2	2
August	17	1	2	...	...	3	...	3
September	6	...	...	...	...	...	...	...
October	10	2	3	2	...	7	...	7
November	2	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
1907.								
June	1	...	...	...	...	...	...	...
July	5	...	3	1	1	5	...	5
August	5	...	2	4	20	26	...	26
September	6	...	...	...	...	...	...	...
October	9	...	...	...	...	...	...	...
November	2	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1906.											
June	...	...	...	...	...	...	...	...	...	...	...
July	10	...	1	5	1	...	...	...	7	...	7
August	24	...	1	1	...	4	...	...	6	...	6
September	5	...	...	...	...	...	...	...	...	...	...
October	14	...	...	...	...	...	...	...	...	...	...
November	5	...	...	...	...	...	...	...	...	...	...
December	2	...	...	...	...	...	...	...	...	...	...
1907.											
June	3	...	...	...	...	...	...	...	...	...	...
July	10	...	...	1	...	1	...	2	4	...	4
August	31	...	...	1	1	12	...	12	26	...	26
September	7	...	...	...	...	...	...	...	...	...	...
October	9	...	...	...	...	...	...	...	...	...	...
November	6	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...

Appendix II—*concld.*

Table showing occasions of carrying water in Cauvery and Vennar at depth exceeding full supply stated in the rule.

The Cauvery.

Year and month	Total number of days, when passing over 4·5 practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood condition	Number of days extra water carried for irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1908.								
June	...	...	...	...	...	...	...	...
July	19	5	9	...	...	14	...	14
August	17	4	13	...	...	17	...	17
September	6	...	...	...	...	...	...	...
October	3	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...

The Vennar.

Year and month	Total number of days, when passing over 7 feet practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10–11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1908.											
June	...	...	...	...	...	...	...	...	...	...	...
July	16	...	...	...	...	...	...	...	...	...	...
August	15	...	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...	...	...
October	2	...	...	...	...	...	...	...	...	...	...
November	3	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...

Appendix III

STATEMENT showing the area of irrigation under the Cauvery above the Upper Anicut.

Main river	Tributary	Number of channels	Number of tanks	Year	Area irrigated in acres in year given in column 5.	Year	Area irrigated in acres as verified by the Collector for years given in column 7.
1	2	3	4	5	6	7	8
Cauvery L ...	Raja channel including Mohanur ...	1	...	1909	5,146	1912	5,641
Do R. ...	Pugalur channel	1	...	1901	2,328	,,	2,328
Do R. ...	Vangal do	1	...	,,	1,115	,,	1,115
Do R. ...	Nerur do	1	...	,,	1,760	,,	1,760
Do L. ...	Komarapalam channel	1	...	1884	1,634	,,	1,005
Do L. ...	Aiyalur do ...	1	...	,,	1,081	,,	329
Do L. ...	Siplapathur do	1	...	,,	661	,,	663
Do R. ...	Krishnarayapuram channel ...	1	...	,,	1,192	,,	1,224
Do R. ...	Mahadanapuram do ...	1	...	,,	804	,,	804
Do L. ...	Thottiam Chinna vaikal	1	...	,,	2,878	,,	2,811
Do L. ...	Do Peria vaikal	1	...	,,	751	,,	751
Do R. ...	Marudur Nattu vaikal	1	...	,,	5,856	,,	5,881
Do L. ...	Sreenivasanallur channel	1	...	,,	328	,,	337
Do L. ...	Musiri vaikal	1	...	,,	4,195	,,	4,111
Do L. ...	Amer do	1	...	,,	354	,,	354
Do R. ...	Nangam vaikal	1	...	,,	2,320	,,	1,643
Do R. ...	Wyakondan channel	1	...	,,	25,627	,,	24,736
Do R. ...	Ramavaikolai channel	1	...	,,	1,177	,,	1,748
Do L. ...	Konaselem channel	1	...	,,	365	,,	365
Do L. ...	Peruvali channel	1	...	1907	15,086	,,	15,086
Do L. ...	Panguni channel	1	...	,,	6,629	,,	6,629
Do L. ...	Aiyan channel	1	...	,,	14,737	,,	14,737
	Total ...	...	...	...	96,024	...	94,058

Appendix IV.

STATEMENT showing water-level recorded at Boodangudi sluice at north end of Veeranam tank.

[When the tank is full, the letters over the figures indicate the probable source from which the impounded water was obtained. **C** meaning from the catchment area: **D** meaning from the Coleroon through the Vadavar. The full level of the tank at capacity 918 million cubic feet is +43·50. The deep bed of the tank is at level about +38·0.]

Month	June				July				August				September			
Date	1st	8th	15th	24th	1st	8th	15th	24th	1st	8th	15th	24th	1st	8th	15th	24th
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Year.																
1890—1891 ...	...	...	...	...	...	...	...	...	38·70	39·19	39·29	39·69	40·49	42·59	C 43·79	42·19
1891—1892 ...	...	...	...	...	...	...	39·39	39·49	40·79	39·99 D	38·29 C	38·59	37·09	36·49	37·19	...
1892—1893 ...	...	...	36·39	39·09	39·19	40·69	40·29	41·19	42·69	43·09	43·59	43·19	43·49	43·09	42·79	41·79
1893—1894 ...	...	...	...	38·79	40·39	40·89	41·09	41·29	40·09	39·59	40·49	40·39	35·99	38·59	40·09	41·34
1894—1895 ...	35·09	35·09	34·79	37·34	39·99	40·09	38·69	38·59	40·19	38·39	37·39	39·99	43·09	43·39	Not available.	
1895—1896 ...	...	...	...	36·19	40·89	41·94 D	41·09	38·99	38·79	39·69	40·29	40·59	40·29	39·09	C 42·79	C 43·39
1896—1897 ...	...	...	...	...	39·89	43·59	42·39	43·29	43·49	42·99	42·19 D	42·79 D	41·89 D & C	41·69 D	41·19 D & C	40·29 D & C
1897—1898 ...	...	...	...	38·79	42·09	41·99	41·49	42·69	41·69	43·09	45·39	43·79	44·19	44·14	43·69	43·69
1898—1899 ...	37·99	...	...	38·89	40·89	30·59	40·39	39·39	29·29	41·09	40·39	38·69	37·89	39·89	40·09	42·69
1899—1900 ...	...	...	...	38·89	40·59	41·29	42·19	41·89 D	39·69 C & D	38·79	... D	... D	... D & C	38·59 C	40·29 D & C	40·09 D
1900—1901 ...	...	...	...	...	38·79	41·39	42·39	43·79	43·49	42·99	44·79	44·09	43·79	43·69	44·29 C	43·99 C
1901—1902 ...	...	...	...	...	40·99	40·09	41·89	42·69 D	42·29	42·29	42·09	41·69	41·99	41·29	43·79	44·39 C & D
1902—1903 ...	...	...	...	...	...	...	...	43·69	43·39	42·59 D	41·59	40·39	38·29	35·59	39·49 C & D	41·79 C
1903—1904 ..	39·79	39·39	39·19	...	...	... D	... D	41·29	41·39 C	43·99	43·29	42·59	42·49	43·39	44·69	44·69
1904—1905 ...	...	...	...	...	42·19	43·69	44·29	43·39	43·59	42·59	42·49	42·19	41·49	41·39 C	39·59	41·29
1905—1906 .	...	...	...	...	...	38·79	41·49	41·19	40·79	41·69	41·69	43·49 C & D	42·79 C & D	43·89	43·39	42·89
1906—1907 ...	...	...	...	...	...	...	...	...	41·09	42·79	42·79	43·79	43·89	43·19	42·99	42·69
1907—1908 ...	39·19	38·89	...	...	...	...	41·59	39·99	39·89	39·99	42·49	42·89	42·49	42·69 C	42·09 C	42·49 C
1908—1909 ...	...	...	...	...	...	37·49	40·69	40·99 D	41·89	42·09 D	42·19 C & D	41·39 C	38·99 C & D	43·99 C & D	44·49 C & D	43·89
1909—1910 ...	...	...	...	...	...	40·59	40·59	43·59	43·29	43·49	44·29	43·49	43·99	45·09	44·29	42·89

247

Appendix IV—*concld.*

Statement showing water-level recorded at Boodangudi sluice at north end of Veeranam tank—*concld.*

[When the tank is full, the letters over the figures indicate the probable source from which the impounded water was obtained. **C** meaning from the catchment area: **D** meaning from the Coleroon through the Vadavar. The full level of the tank at capacity 918 million cubic feet is +43·50. The deep bed of the tank is at level about +38·0.]

Month	October				November				December				January			
Date	1st	8th	15th	24th	1st	8th	15th	24th	1st	8th	15th	24th	1st	8th	15th	24th
	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Year																
1890-1891 ...	40·69	41·69	42·09	41·69 C	43·59 C	44·29 C	43·49 C	42·19	40·39	39·09	38·79 C	... C	35·39 C	34·94	35·54	37·89
1891-1892 ...	36·09	38·19	39·19	43·59	44·39	44·59	44·39	43·09	41·69	40·69	44·89	45·09	44·49	43·59	42·59	41·59*
1892-1893 ...	41·29	41·09	40·84	41·29 C & D	40·89	39·99 C	38·09 C	... C	37·79 C	38·49 C	...	37·99	37·79	37·29	35·99	34·99
1893-1894 ...	40·59	40·29	43·39	43·49	43·44	44·29	45·09	46·99 C	44·49 C	43·49 C	42·89	41·99	40·69	40·29	40.09	39·59
1894-1895 ...	Not available.						42·79	43·49 C	44·39 C	44·19	42·79	41·49	40·59 C	39·39	38·59	35·39
1895-1896 ...	44·79 C	43·89 C	44·59 C	46·09 C	44·69 C	44·49 C	42·99 C	43·49 C	44·29 C	42·89 C	41·39 C	39·49 C	47·44 C	43·69	42·69	41·79
1896-1897 ...	41·89 D & C	42·59 D & C	42·09 D & C	41·39 D	41·19	40·59	44·49 C	45·69 C	43·69 C	44·44 C	43·54 C	44·59 C	43·29	42·49	41·09	39·99
1897-1898 ...	44·49 D & C	43·49 D & C	43·59 D & C	43·69 D & C	42·59 C	41·79 C	40·64 D & C	38·54 D & C	39·34 C	39·69 C	38·34	37·89	34·99 C	...	38·59	35·49
1898-1899 ...	43·89	44·14	44·99	44·19 C	44·89 C	46·84 C	44·79 C	43·59	46·44	44·39	43·19	41·99	44·79	43·99	43·49	43·49
1899-1900 ...	39·89	38·79	38·09	44·79	44·69	43·89	43·29	41·79 C	40·29 C	40·59 C	39·79	38·19	... C	...	...	...
1900-1901 ...	42·69 C	42·79 C & D	41·59 C & D	41·49	41·19	40·49 C	39·29 C	45·09 C	44·19 C & D	43·69	42·69	44·99	43·99	42·89	41·99	41·49
1901-1902 ...	44·09 C	44·49	44·09	43·09 C & D	42·69 C	43·79 C & D	44·69 C	44·49 C	43·79 C	43·39 C	43·39 C & D	42·29 C & D	40·79 C	42·29 C	43·39 C	42·89
1902-1903 ...	43·49 C & D	43·19 C & D	43·39 C & D	44·19	44·59 D	44·79 C	44·49 C & D	44·99 C & D	44·69	47·09 C & D	44·79 C	44·09 C	43·69 C	44·39 C	43·69 C	43·29
1903-1904 ...	44·89	44·09	43·69 C	43·59 C	43·69 C	43·69 C	44·49	44·19	44·00	44·19	44·09	44·19	44·69	43·99	43·69	43·69
1904-1905 ...	43·09	42·39	43·59 C	44·69 C & D	44·59	43·89	42·79	40·59 C	37·79 C	...	...	41·09	40·89	40·29	39·79	39·39
1905-1906 ...	41·39	40·99	44·39	43·99 C & D	42·79 C & D	40·29 C	43·09 C	44·99 C	44·89	43·69	42·49	40·19	38·49	38·59	...	42·59
1906-1907 ...	41·79	40·39 C & D	40·39 C	44·99	44·59 C	43·59 C	47·19 C	45·19 C	...	...	...	...	44·49	44·09	43·19	42·29
1907-1908 ...	42·89	44·59	43·89	42·79 C	43·79 C	47·09 C & D	43·99	43·99	43·39	41·69	41·19	42·99	43·39	42·99	42·59	42·19
1908-1909 ...	42·39	41·49	40·79	45·79 D	45·89	44·59	43·29	40·69	38·89	35·09	...	...	39·29	43·79	43·79	43·39
1909-1910 ...	41·49	41·79	43·29	44·09	42·69	41·69	40·59	39·79	38·69	...	...	...	36·19	35·89	37·29	...

* Sill of sluice=34·59=zero of the gauge.

DIAGRAM

SHOWING

AREA CHARGED AS IRRIGATED

IN

THE CAUVERY DELTA & THE LOWER COLEROON ANICUT SYSTEMS.

FIG: I. CAUVERY.

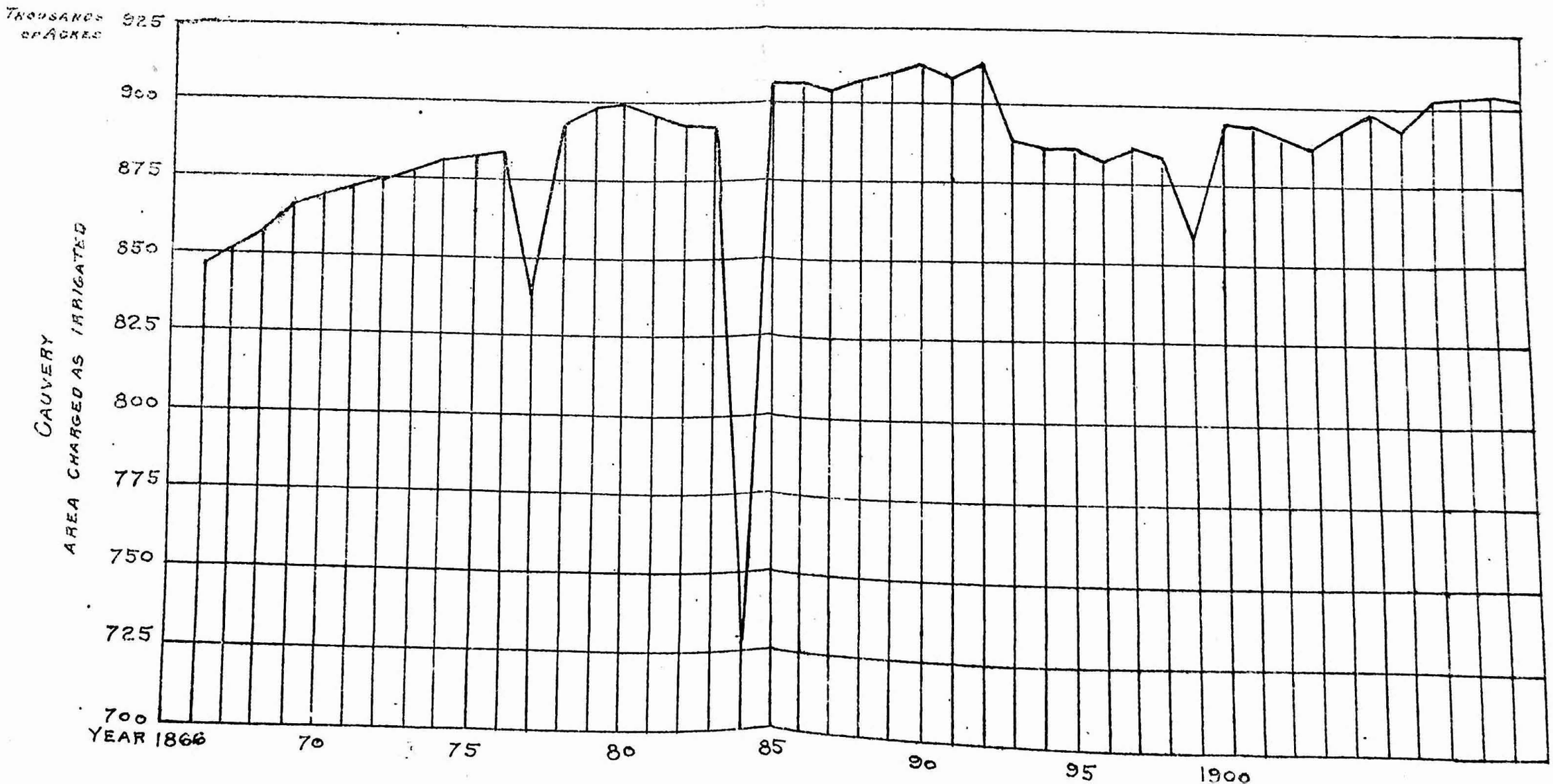


FIG:2.

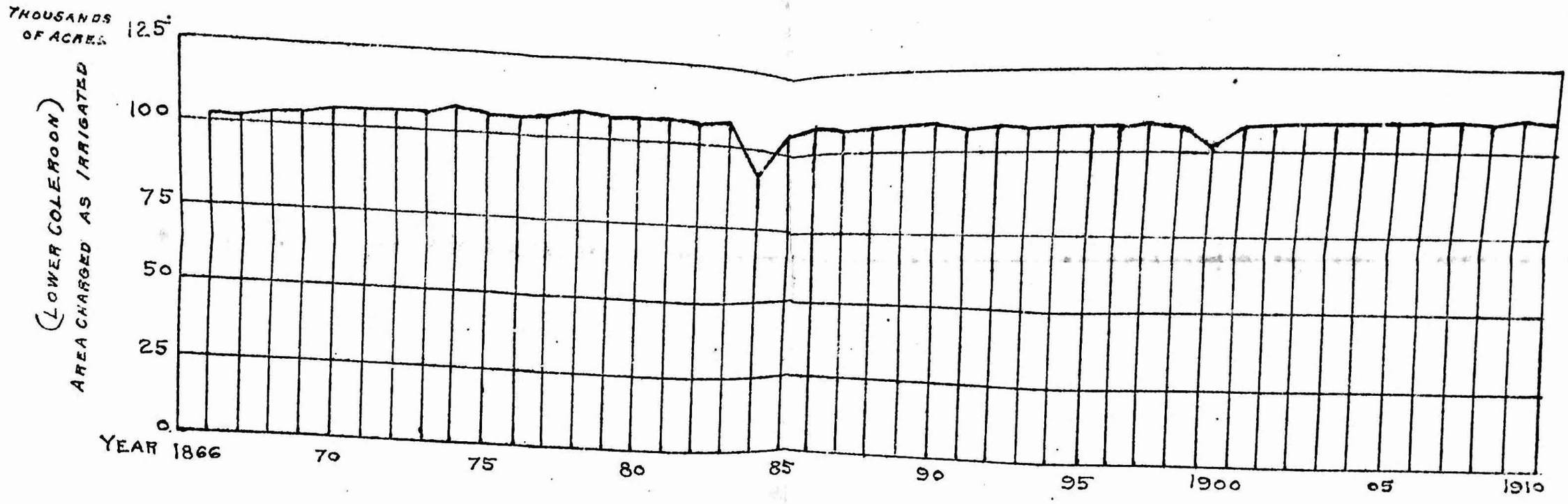
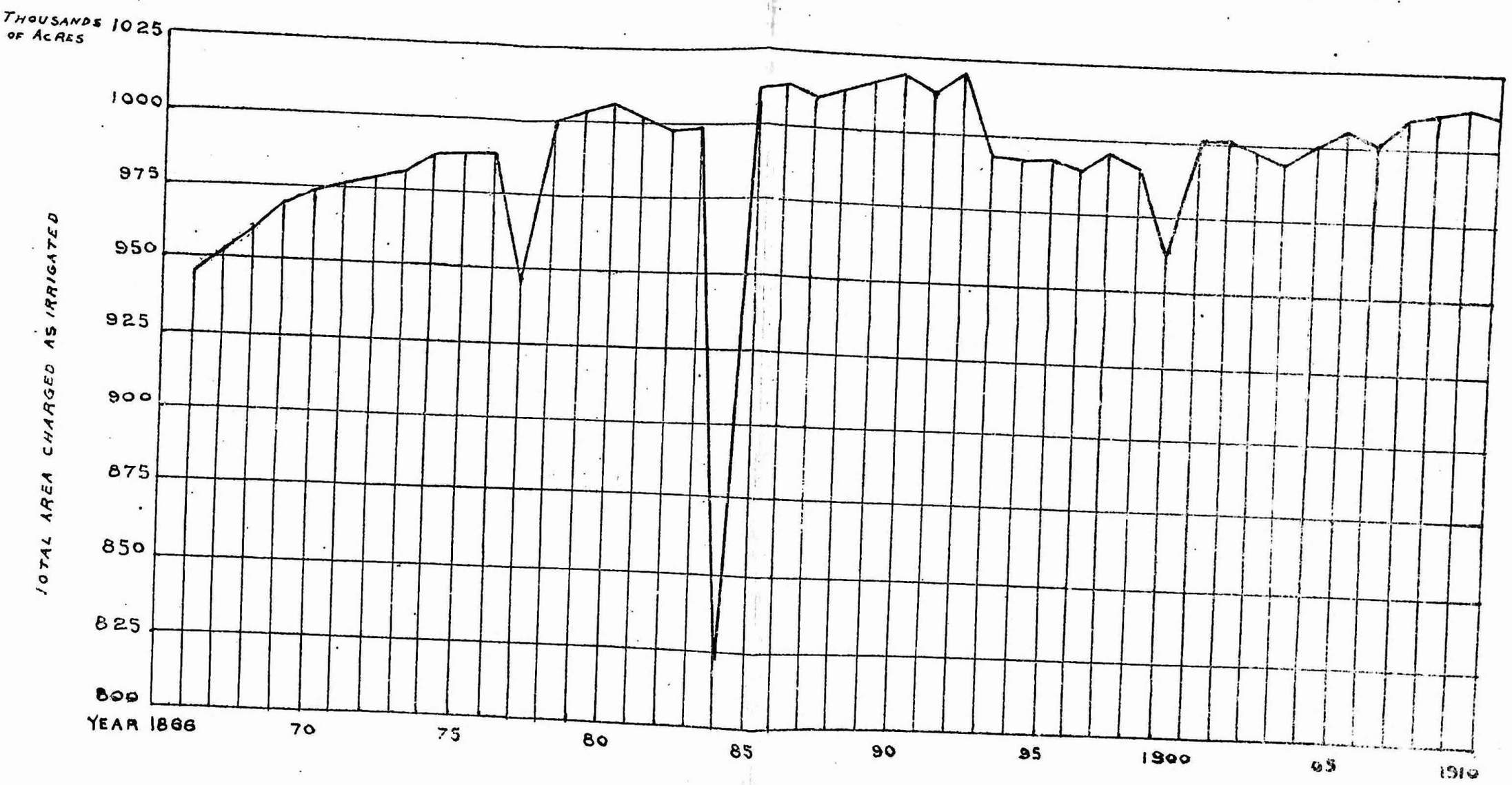


FIG:3. TOTAL CAUVERY AND COLEROON.



NOTE—/ THE DECREASE OF 1884 WAS DUE TO THE LOSSES OF CROP DUE TO SERIOUS DAMAGES &C: OCCASIONED BY THE FLOODS OF THAT YEAR.

THE AREAS IN FIG:1 ARE TAKEN FROM TRIENNIAL IRRIGATION REPORT FOR TRIENNIUM ENDING·1901·1902 FOR THE AREAS 1866 TO 1901·1902.

THE SUBSEQUENT AREAS ARE FROM THE SUBSEQUENT TRIENNIAL REPORTS.

THE AREAS FIG:2. FROM 1893 ARE EXTRACTED FROM THE TRIENNIAL REPORTS—FROM 1874 TO 1879. FROM C. VINCENT'S MONOGRAPH.

ON CAUVERY DELTA AND LOWER ANICUT SYSTEM.

THE AREAS OF REMAINING YEARS ARE EXTRACTED FROM ANNUAL IRRIGATION ADMINISTRATION REPORTS.

CED BY. M.S.J.

CENTRAL OFFICE. 25-7-14.

Appendix VII.

Provisional Rules defining the method of passing down supplies required for irrigation in Madras Presidency.

The total flow in the river up to a limit of 29,300 cusecs, as measured at the anicut at Sivasamudram, shall be considered as the supply required by Madras during the months of August, September, October and first half of November. During the months of June, July, second half of November and all December, January and February, the required supply shall be 26,700 cusecs.

2. Any flow in the river in excess of this limit will be considered as available for storage in Mysore.

3. From 1st March to end of May the entire flow in the river will be available for impounding within Mysore limits.

4. If it is found impossible to measure the discharge of the river at Sivasamudram, the flow in the Kabbani river on any day shall be deducted from 26,700 cusecs and the remainder shall be the amount to be issued from the reservoir before storage can begin. The amount so issued to be measured as described below.

5. The following arrangements will be made for gauging the discharges in the river in connection with the proposed provisional rules for passing down supplies for irrigation in the Madras Presidency.

Gauges will be established at the following sites:—

(1) Kalhalli Anicut on the Hemavati.

(2) Chamaraja Anicut on the main Cauvery river.

(3) Ayerhalli Katte on the Lakshmanatirtha.

(4) River-bed immediately below the site of reservoir dam at Kannambadi.

(5) The lowest anicut on the Kabbani.

The gauging at these sites will be maintained till the reservoir is constructed.

6. After the reservoir is constructed, the inflow and outflow will be measured at the reservoir itself; but whenever any difficulty is experienced in doing so, the measurement will be taken at the gauge sites mentioned above.

7. The gauge at each station will be observed twice a day, namely, at 6 A.M. and 6 P.M., and the average taken as the mean rate of discharge for the day.

8. A register of gauge discharges shall be maintained on a printed form for each station.

9. Copies of the record of observations at the several gauge stations shall be forwarded from day to day to the Madras Government; similarly, the daily observations at the Bhavani bridge and the Cauvery Dam shall be forwarded from day to day to the officer in charge of the Cauvery Reservoir. From the date the reservoir comes into operation, the daily discharges from the Cauvery Dam and the Bhavani Bridge shall be communicated by wire to the officer in charge of the scheme. The charges in this connection to be borne by the Mysore Durbar.

Appendix IX.

Calculations of discharge at Sivasamudram making assumptions for velocity of approach.

The system of computation of discharges at Sivasamudram as discharges over weirs without velocity of approcach and with clear overfall is undoubtedly erroneous.

The velocity of approach is, in the case of the Kollegal Branch, the factor which really governs the discharge and in the case of the main anicut left branch has a material effect on it.

In the following pages certain stated assumptions are made as regards velocity of approach and of "afflux" in the case of Kollegal anicut and discharges worked out on the basis of these assumptions serve to confirm the belief that for low discharges the records of discharges advanced are sufficiently near the truth as to allow of acceptance.

Let it be assumed that the velocities of the branches of the river at Sivasamudram are as under for the gauge-readings of main anicut noted :—

Gauge-reading	up to			1	foot,	3	feet per second.
,,	above	1	and	2	feet,	4	,, ,,
,,	,,	2	,,	3	,,	5	,, ,,
,,	,,	3	,,	4	,,	6	,, ,,
,,	,,	4	,,	6	,,	6	,, ,,
,,	,,	6	feet,	8	,,	per second.	

In such cases $h_a = \frac{V^2}{2g}$ and is

	$h_a =$
Velocity 3 feet per second	0·14
,, 4 ,, ,, ...	0·25
,, 5 ,, ,, ...	0·39
,, 6 ,, ,, ...	0·56
,, 7 ,, ,, ...	0·76
,, 8 ,, ,, ...	1·00

For the main branch an anicut with clear overfall the discharges per foot run.

$$D = \left\{ (h+h_a)^{\frac{3}{2}} - h_a^{\frac{3}{2}} \right)$$

Discharges per foot run on above formula and assumptions as regards velocity of approach are :—

Depth on crest		
FT.		
0·5	discharges per foot run	1·426
1·0	,,	3·611
1·5	,,	6·790
2·0	,,	10·080
2·5	,,	14·460
3·0	,,	18·600

Table of comparison with results neglecting velocity of approach.

Gauge-reading feet	Without velocity of approach discharge	With velocity of approach as assumed	Comparative deficiency per cent
0·5	1·09	1·43	31
1·0	3·10	3·61	17
1·5	5·69	6·79	20
2·0	8·77	10·08	15
2·5	12·26	14·46	18
3·0	16·11	18·60	15

These percentages are excessive as, on account of the "horse shoe" shape in plan of the anicut, a good deal of the effect of the velocity of approach is lost and the discharges are unlikely to be more than half the percentages above in excess of recorded ones, and this is taken for computation which follows :—

Discharges of "Kollegal Extension."

Gauge-reading, main anicut	Depth, Kollegal Extension	Kollegal Extension		Reading, Kollegal anicut gauge
		Length	Discharge	
0·5	0·9	412	1,200	Nil
1·0	1·4	590	3,080	0·3
1·5	2·0	630	5,600	1·0
2·0	2·55	700	8,750	1·0
2·5	2·75	778	11,180	2·25
3·0	3·0	833	13,760	2·75

The following shows discharge, Kollegal Extension, for recorded lengths for flow at velocity and depth named.—

Main anicut gauge 1 Sq. Ft.	Kollegal Extension. Area of section 2 Sq. Ft.	Velocity foot per second 3	Column 2 × column 3, discharge computed 4	Recorded discharge 5	Centage excess 6
0·5	369	3	1,107	1,200	8
1·0	826	3	2,478	3,080	25
1·5	1,260	4	5,040	5,600	11
2·0	1,785	4	7,140	8,750	22
2·5	2,139	5	10,695	11,180	5
3·0	2,499	5	12,495	13,760	10

Assumptions for discharge, Kollegal Anicut.—The Kollegal Anicut is computed as with a clear overfall without velocity of approach, while as a fact it has velocity of approach and is submerged at a very early stage of discharge.

With a gauge-reading on the main anicut gauge of 2 feet it is barely visible and may be considered to have an afflux of 1 foot.

The discharges of the anicut are computed for velocities of approach assumed for the other computations for depths of flow 0·3, 1·0, 2·25 and 2·75 feet corresponding roughly to gauge-readings 1, 1½, 2, 2½, 3 feet on main anicut.

The afflux assumed are—

						FT.
1·8	depth over crest afflux		...	...	...	1·1
2·25	,,		...	...	...	0·9
2·75	,,		...	...	...	0·25

Gauge-reading	Depth of flow	Afflux	Velocity of approach	Discharge without velocity of approach	Discharge with velocity of approach	Comparative deficiency *per cent.*
				CUSECS.	CUSECS.	
1·0	0·3	...	3	156	230	47
1·5	1·0	...	3	949	1,105	16
2·0	1·8	1·1	4	2,289	2,962	29
2·5	2·25	0·9	5	3,201	4,162	30
3·0	2·75	0·25	5	4,327	4,171	—3·6

ABSTRACT showing the discharges of the anicuts and river (excluding sluices) past Sivasamudram on the assumptions made above.

Gauge-reading main anicut	Recorded discharges				Discharges on assumptions made above				Excess percentage
	Discharge, main anicut	Kollegal Extension	Kollegal anicut	Total	Discharge, main anicut	Kollegal Extension	Kollegal anicut	Total	
1	2	3	4	5	6	7	8	9	10
·5	2,474	1,200	...	3,674	2,860	1,107	...	3,967	8·0
1·0	7,037	3,080	156	10,273	7,615	2,478	230	10,323	0·5
1·5	12,916	5,600	949	19,465	14,164	5,040	1,105	20,309	4·3
2·0	19,908	8,750	2,289	30,947	21,395	7,140	2,962	31,497	1·8
2·5	19,830	11,180	3,201	42,211	30,327	10,695	4,162	45,184	7·0
3·0	36,670	13,760	4,327	54,657	39,385	12,495	4,171	56,051	2·5

These results tend to confirm the view that the recorded discharge put forward by Mysore may be accepted up to a discharge of 30,000 to 40,000 cusecs and indeed, if these results are accepted, up to a higher total.

W. M. ELLIS, COL., R.E.

Appendix X.

The under-noted table shows the discharges by gauging the Cauvery in August and September at Danakere, six miles above Sivasamudram, at the site selected by the Assessor. The gauging is separately reported on, but it may here be stated it was carried out with surface floats and a co-efficient of reduction of 0·82 was used to reduce surface to mean velocities.

The results of daily gaugings for three consecutive weeks, 29th August to 18th September, are tabulated with the discharges of the Cauvery at Bhavani bridge two days later and at the Upper Anicut three days later.

The discharges at the two places named show continuous and daily loss in transmission throughout the whole period.

The loss in transmission between Sivasamudram and the Upper Anicut for the whole period is 14·41 *per cent.*

As regards the losses between Sivasamudram and Bhavani bridge, it will be seen that here also continuous losses occur. The total loss for the period is 15·21 *per cent.* and the maximum for one week is 19·05 *per cent.* The distance between Danakere and Bhavani is 120 miles and from Kannambadi to the Upper Anicut is 257 miles.

Month and date	Gauged discharge at Danakere	Cauvery discharge at Bhavani Bridge two days later		Cauvery discharge at the Upper Anicut three days later		Sivasamudram	
		Discharge	Percentage loss in transmission from Danakere	Discharge	Percentage loss in transmission from Danakere	Reading upper gauge, main anicut, 1913	*Discharge from Mysore calculations
	CUSECS.	CUSECS.		CUSECS.			CUSECS.
August 29th	14,204	11,426	—19·56	12,992	—8·53	1·40	19,000
,, 30th	12,955	10,498	—18·96	11,600	—10·46	1·30	17,250
,, 31st	14,510	11,925	—17·81	12,992	—10·46	1·30	17,250
September 1st	14,442	10,939	—24·25	11,600	—19·68	1·30	17,250
,, 2nd	11,607	10,498	—9·55	10,347	—10·85	1·20	15,500
,, 3rd	12,686	14,488	+14·20	12,992	+2·41	1·30	17,250
,, 4th	17,212	15,045	—12·59	16,538	—3·92	1·40	19,000
Total, one week ...	97,616	84,819	—13·11	89,061	—8·76	...	1,22,500
September 5th	17,062	13,943	—18·28	15,080	—11·62	1·50	21,000
,, 6th	14,433	12,412	—14·00	12,296	—14·80	1·40	19,000
,, 7th	13,515	11,426	—15·46	10,974	—18·80	1·30	17,250
,, 8th	11,297	10,939	—3·17	9,727	—13·90	1·20	15,500
,, 9th	10,548	7,923	—24·89	7,679	—27·19	1·10	13,750
,, 10th	9,033	7,923	—12·28	7,285	—19·35	1·05	12,875
,, 11th	8,464	6,670	—21·19	6,496	—23·95	1·00	12,000
Total, one week ...	84,352	71,236	—15·55	69,537	—17·56	...	1,11,375
September 12th	8,081	6,570	—17·46	5,986	—25·92	·95	11,150
,, 13th	6,966	5,974	—14·24	5,475	—21·40	·90	10,300
,, 14th	6,318	5,626	—11·37	5,220	—17·77	·85	9,525
,, 15th	6,037	4,350	—27·94	4,849	—19·68	·80	8,750
,, 16th	5,598	4,350	—22·29	4,849	—13·38	·75	8,050
,, 17th	6,325	4,918	—22·24	4,849	—23·33	·75	8,050
,, 18th	6,557	5,278	—19·50	5,220	—20·39	·80	8,750
Total, one week ...	45,912	37,166	—19·05	36,448	—20·61	...	64,575
Grand Total, three weeks ...	2,27,880	1,93,221	—15·21	195,046	—14·41	...	2,98,450

*NOTE.—These figures are obtained from a curve of discharge drawn on the basis of Mysore calculated discharges.

Exhibit My. 6.

ENQUIRY INTO THE QUESTION OF STORAGE OF THE CAUVERY WATERS WITHIN MYSORE TERRITORY.

PART I.—THE TRUE INTERPRETATION OF THE AGREEMENT OF 1892.

SECTION i.—PRELIMINARY.

Previous history.—Before discussing in detail what is the exact interpretation to be put on the Agreement of 1892, it seems necessary to indicate, however briefly it may be, the circumstances which led to that agreement.

After the Province was taken over under British management in 1831 and during the 50 years of British Administration thereafter, an active Public Works policy was pursued. In the year 1854, the Court of Directors strongly urged the execution of "such works of unusual magnitude and importance as might appear calculated to promote, in the largest degree, the development of the resources of the country."

Following the above advice, a regular Public Works Department was soon after organized and a scheme for developing the irrigation of the State formulated in 1866. As a result of the active policy then inaugurated, many old tanks were restored and new ones constructed, up to the great famine of 1876-77, when, on account of the disastrous effects of the famine on the general resources of the State, it became necessary to put a stop for a time to all but the most insignificant works.

The policy of restoring old tanks and constructing new ones was revived by the Durbar after the Rendition, in pursuance of the fulfilment of the original intentions of the British Government. It was after the commencement of the construction of three new tanks was undertaken in the Kolar District that serious difficulties were raised about the year 1889 by the officers of the Madras Government.

2. *Agreement of 1892.*—A preliminary conference of the Madras and Mysore officers was then held at Ootacamund in 1890. The officers of the Madras Government having assumed an uncompromising attitude by stating that every irrigation work in Mysore of any consequence required their previous consent, all hope of an amicable settlement had to be given up. It was then that the late Sir K. Sheshadri Iyer appealed to the Government of India by forwarding a Memorandum explaining the whole case with his letter dated the 10th June 1890 (Appendix A). After protracted correspondence and discussion, the Government of India preferred that the matter should be settled, if possible, by some understanding between Madras and Mysore. The Durbar again made endeavours in conference with the Madras Government to arrive at an amicable understanding regarding future irrigation operations, so that "controversy might be obviated in respect of individual works and a sphere of operations declared, in which Mysore projects would be absolutely untrammelled." The Agreement of 1892 embodies the result of this understanding.

3. *Sir K. Sheshadri Iyer's Memorandum.*—With a view to explain clearly the object and scope of the agreement, Sir K. Sheshadri Iyer drew up a further Memorandum on the subject in 1899. This has already been submitted to the Arbitration Committee as Mysore Exhibit (My. 2 A). The Memorandum of June 1890 with the forwarding letter to the Resident and the Note of 1899 present a very

complete and cogent exposition of the Agreement of 1892 and the Durbar submit that the opinions expressed by one who took a prominent part in framing the agreement cannot but be entitled to great weight at the hands of the Arbitration Committee in arriving at a correct interpretation of that document.

A perusal of these papers will show that the main object of the Agreement of 1892 was to allow the State to proceed unhampered in the development of their irrigation schemes by securing " *an arrangement best calculated to avert the consequences of serious loss to the British Government without checking the legitimate and reasonable progress of the irrigation works of Mysore.*" It is in this spirit that the various clauses of the agreement have to be considered and interpreted.

4. *Recent irrigation developments.*—Recently, in accordance with the recommendations of the Irrigation Commission in 1903, the possibilities of constructing large storage reservoirs to impound the rainfall from the Western Ghauts and make it available for irrigation in regions of scanty rainfall, have been systematically investigated in Mysore, as in other parts of India, and the Cauvery Reservoir project has been selected as one demanding the first attention.

But the Agreement of 1892 acts somewhat as a bar against Mysore adopting the policy laid down by the Irrigation Commission, while it gives free scope to Madras to develop her reservoir schemes on the Cauvery or other connected rivers. The agreement has already subjected Mysore to inconvenient and harassing restrictions. What is more, every project pushed on and completed by the Madras Government creates additional prescriptive rights *for them and against Mysore*, so much so, that, if no effective steps are taken immediately by the Durbar to utilize its natural advantages to the fullest extent now possible, the hope of building any large reservoirs in future will have to be given up. While each British Province would be free to follow the policy laid down by the Irrigation Commission in 1903, Mysore alone would be left in the background, because an agreement brought about eleven years previous to that date, would be quoted as a bar against every reasonable development.

5. *Correct interpretation of agreement.*—From the very outset it has been recognised that the relative rights of the two Governments cannot be decided on purely legal and technical grounds. It was with this view that clause 3 of the agreement lays down that disputes connected with individual works should be settled "in accordance with what is fair and reasonable under all the circumstances of each individual case." As already stated in paragraph 23 of the Mysore case, the Agreement of 1892 gives Mysore full freedom to utilize whatever supply is not required by Madras to satisfy actually existing prescriptive rights. It is for the Arbitration Committee to devise a method by which this freedom can be exercised by Mysore without materially infringing on the rights of Madras.

Section ii.—Examination of the Legal Arguments of Madras.

6. *Law of prescription.*—As regards the legal aspects of the case, it is agreed on both sides that the Agreement of 1892 should be the basis of decision. Many of the arguments advanced and the views urged in the statement of Legal Arguments put forward by Madras, are therefore of little importance, and in some cases merely of academic value.

7. Mysore do not dispute the position taken up in paragraph 4 of the Madras case, namely, that it would be sufficient to determine the rights of Madras as legally acquired and actually existing in 1910.

8. In paragraph 6, some remarks are made about the relative importance of the two questions which have to be decided by the Arbitration Committee. As it is conceded that both the questions have to be decided, the distinction made is not of much significance. Whether as a subordinate or a principal question, the extent of the rights of Madras has to be determind, as on it depends the answer to the question whether Madras is right in objecting to the construction of the new reservoir.

9. The observations in paragraph 7, about the meaning of the terms in Rule III of the Agreement of 1892, put a strained construction on the passage which

Mysore do not accept. Even in deciding the exact meaning of an agreement, and, in interpreting law, what is fair and reasonable cannot be disregarded.

The contention of Mysore is that the extent of the prescriptive rights of Madras must be decided on the bases of (1) the law of prescription and (2) what is fair and reasonable. Both these are laid down in clause III of the Agreement of 1892 and there is no warrant for arbitrarily distributing the two parts of the expression, namely,—

> "being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case,"

between two parts of the previous phrase, namely,—

> "the existence, extent and nature of such right" and "and the mode of exercising it."

Such an interpretation is opposed to the ordinary rules of grammatical construction and the framers would easily have used more suitable phraseology, if their meaning was what the Madras case suggests. It is further most important to remember that the question of the extent of a right is one of *mixed law and fact*, the province of each of them being separate. The test of "what is fair and reasonable" has to be applied in determining the question of fact on which the extent of the prescriptive right depends and this can be done without coming into conflict with law. Hence the question raised in paragraph 7 by Madras, "what is to happen if the two criteria differ" need not be seriously considered.

10. Mysore do not rely on any unlimited natural right at all in this particular case, as the Agreement of 1892 is the basis on which this controversy has to be decided. It is therefore considered unnecessary to notice in detail the observations and arguments contained in paragraphs 9 to 16 of the Madras case. Though there is no statute in force dealing with easements generally, Sections 26 and 27 of the Limitation Act dealing with the subject of acquisition of easements by prescription have long been in force in Mysore also and there can be little doubt that this fact was in the mind of the framers of the agreement in question.

After the Agreement of 1892, it is of little use to consider what the rules of International Law and the law of Riparian Rights are on this question, whatever their force, if the question had to be decided independently.

That the "law of prescription" was meant to be the governing principle is clearly shown by the course of previous controversy that led to the agreement in its final form. The Government of Madras wished to eliminate from the original draft the expression "in accordance with the law on the subject of prescriptive right to use of water." But the Mysore Government replied that "to eliminate from Rule III the words 'in accordance with the law on the subject of prescriptive right to use of water' would be to acknowledge that the Madras Government in considering the existence, extent and nature of a prescriptive right to be possibly affected by a proposed Mysore work could set aside or refuse to be guided by the law on the subject." (Extracted from demi-official letter dated 30th July 1891, from the Secretary, Public Works Department, Mysore, to the Secretary, Public Works Department, Madras.) The retention of this passage was thereupon agreed to by Madras in a D. O. letter dated 6th August 1891, from the Secretary, Public Works Department, Madras.

11. It should also be noted that the rules deduced from the usage of countries in which irrigation is of no account cannot be applied without qualification to this country, where it is of such paramount importance.

The argument that Madras had rights prior to 1892, and that all their rights were not acquired only by a 20 years' prescriptive user has no practical significance. We are solely concerned with the interpretation of the precise terms employed in the Agreement of 1892, and any indefinite claim, which had long been abandoned and of which the existence or extent cannot be proved or ascertained, cannot now for the first time be introduced under its terms. It may be conceded that a mere occasional non-user without an intention of abandoning the user permanently can have no effect on an acquired prescriptive right. But in deciding the extent of the right itself, the question of user cannot be ignored and is most important.

12. What is it exactly to which Madras has acquired a prescriptive right? It cannot evidently be the whole of the water in the river flowing towards the sea. If that were the case, Mysore can never use any more water, however little, than it has been using, and the Agreement of 1892 becomes quite meaningless. Madras can thus acquire a right by prescription only to what they have been utilizing for irrigation in their territory. This view is admitted in paragraph 32 of the Madras case and cannot indeed be controverted. The following reasons also justify the position :—

Rule III uses the terms " prescription " and " prescriptive right " with reference to " use of water " and not to " flow of water." Immediately after the Agreement of 1892 was concluded, the Madras Government put forward a claim under its terms in connection with the construction of the Marikanave Reservoir by Mysore. Madras then claimed, not a right to any flow of water independent of existing irrigation, but a "level required to give a full supply to the (Krishna) delta" (*vide* the Note of Mr. G. T. Walch, Chief Engineer for Irrigation, Madras, No. 58-I, dated 17th March 1892). At the Conference of 1890 between Mysore and Madras, the contention raised for Mysore was that " the Madras rights extend only to the supply which has been actually turned to account for irrigation, " while, on the other side, it was urged that the Madras rights to the flow in the rivers was not limited to the amount actually turned to account for irrigation, but that Madras was entitled by prescription to the whole flow allowed to pass the frontier, at which point Mysore lost all right to or interest in it.

The terms of the Agreement of 1892 show that the Madras Government abandoned the extreme position taken up by them at the Conference in 1890.

13. It is therefore not a sufficient answer to the Mysore case to urge that a certain quantity of water was always flowing over a particular anikat in Madras. The difficulties of interpretation noticed in paragraph 31 are merely the result of hypercriticism, and the test of S. 25 of the Easements Act would make the user of the right the determining factor in this case. Mysore have not the slightest intention of interfering, or asserting that they have a right to interfere, with the right of Madras to have as much water flowing down as is required to irrigate the area that they have been irrigating in accordance with their prescriptive right or to utilize as much water as they have been using for the purpose of enjoying such prescriptive rights. Madras cannot claim to interfere with the construction of any works in Mysore territory or with Mysore impounding or using more water therein for the benefit of the State, so long as they do not thereby materially diminish the supply required for the protection of the prescriptive rights of Madras.

14. *Application of the law to the present case.*—The legal position taken up by Mysore in regard to each of the points (paragraphs 21 to 46 of Madras) relevant to the present dispute is stated below.

15. Mysore do not admit the statement that the flow of one foot over the Upper Anikat (644 *m. c. ft.*) was either necessary or utilized for the purpose of irrigation. This flow is stated to have been indispensable for the purpose of securing 7 feet flow on the Cauvery Dam before the remodelling of the anikat. Assuming that this flow was so enjoyed as to mature into a prescriptive right for that purpose, it amounted in law to an easement of necessity, and became extinct when the necessity thereof ceased as a consequence of the remodelling of the anikat in 1899-1902. (*Vide* Sections 41 and 42 of the Easements Act.)

An easement created for a particular object is extinguished when the object of its existence ceases as in this case. Compare the principle laid down in *National Guaranteed Manure Co. v. Donald* (1859), 4 Hurlstone and Norman's English Exchequer Reports, 8.

This flow of 1 foot which comes as a consequence of the flow of 7 feet claimed as necessary under the old conditions of the Cauvery Delta irrigation, cannot legally be used for any purpose not connected with such lands or such irrigation (*vide* Sections 4 and 21 of Easements Act and *Harris v. Flower & Sons* (1908) 91 Law Times Reports 816, quoted on page 470, Peacock's Tagore Law Lectures, 1899)

The present contention of Madras amounts, from the standpoint taken here, to a right to impose a new burden on Mysore. The test to be applied for determining it is the effect of the way in which the dominant owner has used and now seeks

to use the proposed easement. What was formerly a *dependent* right of easement is now sought to be made an *absolutely independent* one, as the purpose of the right is also sought to be changed to irrigation under the Lower Anikat. This is legally inadmissible (*vide* I. L. R. 23 Bombay, page 595).

16. The alterations made in 1899-1902 clearly show that Madras intended to cease to enjoy the easement (in future) and the right should therefore be deemed to have been lost by abandonment (see Section 38 and illustrations thereto of the I. E. Act). Since 1899-1902 this particular flow has not been used for the purpose for which it is now claimed and this circumstance alone is sufficient to make the rule of *Halve* v. *Oldroyd* inapplicable (see observation on p. 294 in *Crossly & Sons* v. *Lightowler*, equity cases 1866).

Mysore contend that the intent to abandon the right has to be inferred from the long period of non-user and the permanent alteration of the anikat rendering the user unnecessary.

17. *Extent and mode of enjoyment of rights.*—Mysore admit the use of water for irrigation by Madras only up to the limit of 6 feet at the Cauvery Dam. The limit of 7 feet, first mentioned in the Rules of 1896 cannot be claimed as a prescriptive right as the increase is not yet 20 years old (*vide* Sec. 26 of the Limitation Act and Sec. 15 of the Easements Act). It is abundantly shown by the various statements of Madras officers themselves, made independently of this controversy, that 6 feet flow over the Cauvery Dam was quite sufficient for all the delta irrigation that was being carried on (see Part II of our reply).

Both the extent and mode of enjoyment of the right must be fixed with reference to the probable intention of the parties as embodied in the agreement, the purpose of the prescriptive right determined with reference to all surrounding circumstances at the time of the agreement and the accustomed user of such right consistently with the terms thereof.

It is in this connection that the Memoranda of Sir K. Sheshadri Iyer referred to in paragraphs 8 to 10 of the Madras case will be particularly useful.

18. *Nature of user.*—In this case, water is used in periodically fluctuating quantities dependent upon the varying flow in the river and the varying needs of irrigation. These variations can be mapped out by gauge readings and the requirements of irrigation and general rules deduced.

19. *Reciprocal rights of Madras and Mysore.*—Under the Agreement of 1902, Mysore undoubtedly possess the right to dam the Cauvery and to construct a reservoir within their territories, subject to the sole condition that such construction does not affect the prescriptive right of Madras to the use of water. Hence, any system of calculation and measurement of the flow in the river that may be devised should satisfy two conditions, *viz.*, it should not prejudice such right of Mysore and it should also be conducive to the protection of the prescriptive rights of Madras. In other words, Mysore have the right to impound all the excess over the flow due to Madras for prescriptive irrigation.

20. *Place of measurement.*—The first question to be decided is where the supply due to Madras is to be measured. The suggestion of Madras that it should be ascertained above, the Kannambadi Reservoir is open to the serious objection that it seeks to shift the customary and proper place of the measurement so as to unduly increase the burden on Mysore by throwing out of account the several intermediate flows up to the Cauvery Dam, that go to make up the total prescriptive right of Madras. In this way, the Madras proposal fetters the right of Mysore under the agreement, without, at the same time, being necessary "for the protection of the prescriptive right of Madras already acquired and actually existing."

The suggestion of Madras conflicts also with the well-known principles of law that the dominant owner must exercise his right in the mode which is least onerous to the servient owner (*vide* Section 22 of the Easements Act and the several cases quoted in page 471, Peacock) and that, if he, at any time, alters the mode and place of enjoying the easement, he should not thereby impose any additional burden on the servient heritage. (*Vide* Section 23 of the Easements Act, and the numerous cases quoted on pages 472 and 484 of Peacock's Tagore Law Lectures, 1899.)

21. *Mysore proposal.*—It is claimed that the alternative now put forward by Mysore equally serves the interests of both parties. The proposal is to the effect that the waste should be determined at the place where it customarily and actually issues as waste, *i.e.*, at the Upper Anikat itself. This has the merit of being natural and simple as it preserves intact the conditions from which the prescriptive right of Madras has sprung and as it provides for the due protection of Madras prescriptive right already acquired and actually existing.

22. *Disturbance of easement not material, hence Mysore proposal suitable.*—As the right of Mysore to construct the proposed reservoir subject to the prescriptive right of Madras must be admitted, it follows that some disturbance of the existing conditions of the river flow is inevitable. It is impossible to maintain the present conditions if a reservoir, however small, is to be built, and the consent given by the Madras Government to the first stage of the reservoir concedes this by implication, though to a limited extent. It is not every disturbance that interferes with the protection of the prescriptive rights of Madras, for the law does not concern itself with an obstruction which is trivial or immaterial—*De minimis non curat lex.* In order to amount to a disturbance legally cognizable, the act complained of must be capable of causing substantial damage and the act must be such as to *materially* interfere with the lawful enjoyment of the easement, as may be seen from the following :—

1. I. L. R. 2 Bom. 133.
2. I. L. R. 14 Cal. 839.
3. 9 Cal. W. N. 543.
4. Ankerson v. Connelly (1906), 2 Ch. 544.
5. 5 Madras High Court Rept. 6.
6. I. L. R. 2 Mad. 46.
7. Cal. L. R. 97 (Privy Council).

PART II.—PRESCRIPTIVE RIGHTS.

23. The question of the prescriptive rights of Madras has to be considered under two heads:—

(1) The area or extent of irrigation for which the Madras Government have acquired such prescriptive rights.
(2) The limit flow of water necessary to ensure a proper supply for the above area at the point at which the supplies are being drawn off.

Section i.—Area of Madras Irrigation.

24. *Area of irrigation.*— The total area of irrigation under the Cauvery system in Madras for which water can be claimed as a prescriptive right may be considered in two parts:—

(*a*) Area in the delta system including that irrigated from the Lower Coleroon Anikat and the Veeranam tank.
(*b*) Area irrigated from the Cauvery above the Upper Anikat and from the tributaries, the Bhavani, the Amaravati and the Noyel.

25. *Variations in area.*—It is essential that the question of areas should be thoroughly threshed out to arrive at the extent of the prescriptive rights. The correct area is evidently that represented by the extent which enjoyed irrigation facilities about the year 1890, as the present negotiations were started in 1910. It follows therefore that any rights claimed should not include lands newly brought under irrigation subsequent to 1890.

But there are instances where additional areas appear to have come under irrigation in recent years as shown below:—

Locality	Area previously given by Madras	Area now given	Remarks
Under the Cauvery and tributaries above the Upper Anikat.	176,334	208,628	Originally given as 160,000.
Above the Upper Anikat on the main river.	61,500	96,500	Again increased to 99,500.
Lower Anikat	108,000	112,000	
Veeranam tank	45,000	52,000	Obtained from the Madras Government Order No. 400-I, dated 24th Sept. 1909.

From the above it is clear that there have been considerable additions to the area since 1890.

26. *Area above the Upper Anikat.*—The area of irrigation in the Cauvery basin above the Upper Anikat was given as 160,000 acres by the Madras Government in a note furnished to the Durbar in November 1910. But the statement recently given by Madras shows that 176,334 acres were cultivated prior to 1890 and increased to 208,628 acres in 1910. The increased area of 32,289 acres cannot claim water as a prescriptive right and due allowance for this extra cultivation will have to be made from the limits of flow that may be fixed as necessary for the delta irrigation. Taking a duty of 40 acres in the south-west monsoon and 60 in the north-east, the quantity required for this extra area will be 70 m. c. ft., per day, during the south-west and 46 m. c. ft., during the north-east monsoon. These quantities will have to be deducted from the limits that may be fixed as due for the delta area.

27. *The delta area.*—As regards the delta area, the figure given in the recent Madras case, namely, 890,000 acres, excluding Coleroon irrigation, is accepted.

SECTION ii.—QUANTITY OF WATER REQUIRED FOR MADRAS IRRIGATION.

28. *Quantity of water required.*—The Madras Government have now put forward a definite claim as under:—

> A flow up to 7 feet at the Cauvery Dam under the conditions existing *prior to the remodelling of the Upper Anikat* between 1899 and 1902. This quantity would measure 2,944 m. c. ft., in 24 hours, made up of 2,300 m. c. ft., passing over the Cauvery Dam and 644 m. c. ft., passing over the old Upper Anikat under the conditions of that work before remodelling.

29. The concession shown by Madras in paragraph 9 of Part III of their case in claiming 2,944 m. c. ft. only, instead of 3,041 m.c.ft., is in reality no concession at all; for, under the higher claim, the quantity required for the *delta irrigation* is only 1,950 m. c. ft., connoted by a gauge of 6·5 feet on the Cauvery Dam against 7 feet now claimed. It will be presently shown that Madras cannot put forward any claim whatever for the balance of 1,091 m.c.ft., as it would only be wasted into the sea through the Coleroon.

30. The quantity demanded at the Upper Anikat may be examined under two heads:—

(*a*) The limit of flow claimed for the delta irrigation, *viz.*, 2,300 m. c. ft., and
(*b*) that claimed for the Coleroon irrigation, *viz.*, 644 m. c. ft.

Requirements of the Delta Proper.

31. *Delta requirements.*—Madras have stated that this claim for a limit of 7 feet flow at the Cauvery Dam is put forward under the conditions existing prior to the remodelling of the Upper Anikat. Also, Mysore are concerned only with those conditions. It is now necessary to examine, with the help of available records, as required, and with reference to the conditions which prevailed at the time at the Upper and the Grand Anikats, whether this 7 feet limit really represented the full supply flow for delta irrigation during that period.

32. It may be stated at the outset that Madras have been demanding a 7 feet limit, whereas Mysore have been denying the claim on the ground that only a lower limit is permissible as a prescriptive right. But the 7 feet limit was accepted provisionally, only in connection with the first stage of the project which had to be started urgently for generating additional electric power.

In the provisional rules framed for working the first stage of the reservoir, 7 feet limit was taken as the basis. From this no inference can be drawn as to the unqualified consent of Mysore to the 7 feet limit, as indicated in paragraph 27, Part III of the Madras case. The provisional rules did not reach anything beyond the discussion stage. Such a limit cannot evidently apply to the second stage of the reservoir.

33. *Six feet represents correct limit.*—The Durbar have pointed out at a very early stage of the negotiations that Mr. Larminie, a former Chief Engineer for Irrigation, Madras, had distinctly stated that 6 feet was the limit of flow necessary for the deltaic irrigation. But Sir John Benton referring to certain statements in the Madras reservoir project, tried to explain this by assuming that this 6 feet limit was on a higher gauge, which had subsequently been lowered. The Durbar accepting at the time the interpretation given by that officer consented to the 7 feet limit provisionally in connection with the first stage of the project, as noted above. But a further examination of the records recently obtained from Madras through the Arbitration Committee and personal inspection of the conditions at the Cauvery Dam by the Durbar Officers, have disclosed the fact that the 6 feet limit adverted to by Mr. Larminie is the reference to the same gauge as the one on which 7 feet is now claimed.

34. *Evidence from the Bhavani reservoir project.*—A project for the construction of a reservoir across the Bhavani seems to have been prepared some years ago and, in discussing the effects of such a reservoir on the delta supply, conflicting opinions prevailed.

The case of the Mysore reservoir seems analogous to this Bhavani project so far as its effect on the delta irrigation is concerned. Mr. Hughes who favoured the Bhavani project seems to have put the requirements of the delta at a standard limit of 4·8 feet on the gauge at the Cauvery Dam and he has stated that, if this quantity were guaranteed, the Bhavani project could not be objected to. On the other hand, Mr. Larminie maintained that the interests of the delta irrigation would suffer by the reduced limit of 4·8 feet proposed by Mr. Hughes and that a full *supply limit of 6 feet* necessary for the delta system could not be tampered with in any way in favour of the Bhavani project. Colonel Smart agreed with Mr. Larminie's view.

35. As regards the lowering of the gauge alluded to by Sir John Benton, it has been ascertained that the requirements of the delta have been settled with reference to the gauge fixed at the northern end of the Cauvery Dam since its construction. There is, besides, a distinct statement (paragraph 3, page 3, Vol. III) in the Madras Metur project in support of the fact. This statement runs as follows:—

"It is known as the 'Cuavery Dam' and the water levels of the Cauvery at the Upper Anikat are usually referred to the reading of *the gauge at the north end of the Cauvery Dam.* The readings of the Cauvery Dam, north gauge, are constantly referred to in the correspondence and reports for many years regarding the floods and irrigation supplies to the Cauvery delta, and the officers who were experienced with the delta works, got to know by experience, the effect, as flood or supply, of the readings of *this gauge.*

" In the correspondence regarding the adequacy of seasonal supplies which passed some years ago between Colonel Smart and Mr. Hughes, and in the reports of Mr. Moss on his reservoir scheme, it is the depth of water on *this gauge*, that is the standard of supply and not any specific discharge in cusecs."

This quotation shows that the gauge referred to by Mr. Larminie, Colonel Smart and Mr. Hughes was identically the same as the one on which the Madras Government is now claiming 7 feet.

36. *Reference to Bhavani project seems essential.*—It has been noted above that the proposed Bhavani reservoir project is very similar to the Mysore reservoir now contemplated, in so far as its effects on the delta irrigation are concerned. The Durbar are led to infer that the question of the definite requirements of the delta irrigation must have been thoroughly considered in that project by able and competent engineers and their opinions must have been based on their experience of the the delta irrigation and also on reliable records. These opinions cannot but prove to be very valuable in the present controversy regarding the limits of the prescriptive rights of Madras. As the Durbar's request to be supplied with a copy of the report has not been complied with by the Madras Government, it is urged that the Arbitration Committee may call for a copy and verify for themselves whether the depth of 6 feet or less, on the Cauvery Dam, was not really recognised as the maximum limit for deltaic irrigation under the conditions prior to the remodelling of the Upper Anikat.

37. *Evidence from Upper Anikat conditions.*—The conditions of the Cauvery Dam and the Upper Anikat before the remodelling of the latter in 1899-1902 clearly show that the crest of the Upper Anikat was not more than 6 feet above the sill of the Cauvery Dam ; and that this height was fixed for the purpose of giving the full supply limit of 6 feet required for the delta irrigation, is proved by the following extract, from paragraph 35, page 8, Vol. I, Madras Cauvery Reservoir Report:—

"*He (Mr. Larminie) pointed out that the recognised full supply for the delta in the south-west monsoon is 6 feet on the gauge at the Cauvery Dam (Upper Anikat). The Upper Anikat was built to provide that full supply in the Cauvery* and the Tanjore cultivators have a right to expect it whenever it comes naturally and that it should not be interfered with by any arrangements for storage. Nothing should be held back *except the surplus over the 6 feet discharge which now runs to waste over the Anikat.*"

The portions now shown in italics deserve special notice.

38. This significant opinion was expressed so late as 1900 by Mr. Larminie and, coming as it does from one who specially took up a position in favour of the delta cultivators, is very pertinent to the settlement of the matter now at issue. It conclusively establishes that the limit of flow of full supply for deltaic irrigation is 6 feet and not 7 feet as claimed by Madras; and any excess over the 6 feet limit that might have passed over the Cauvery Dam in the flood season owing to the want of controlling arrangements should have been wasted into the Coleroon. The above is not to be considered merely as the opinion of an individual officer, because further independent proofs are forthcoming.

39. *Effect of remodelling of the Upper Anikat.*—In the Metur project report, it is mentioned that the top of the Upper Anikat shutters across the Coleroon is now fixed at 2 feet higher than the previous crest level, *i. e.*, 8 feet higher than the sill of the Cauvery Dam and that facilities for forcing 2 feet extra supplies are provided. This proves also that (8—2=) 6 feet must have been the previous recognised limit of full supply.

40. *Rules of Regulation of 1882.*—The Madras Government rely on rules of regulation (Appendix B) as evidence of their prescriptive right to 7 feet; but, in interpreting *these rules*, it is essential to remember that the full supply to the delta system is represented, *not* by the levels at which the undersluices *are opened*, but by the particular limiting level at which the sluices are to be *closed*. In this light, 6 feet at the Cauvery Dam, or the crest level of the northern branch of the Upper Anikat, *viz.*, 5·9 feet on the gauge mentioned in Rule 2, represents the limit of the full supply to the delta. This is a very important point to which special attention is solicited.

The reason why the higher level mentioned in Rule 1 has to be maintained sometimes is this. The low sill levels of the 25 undersluices would naturally require, when water is standing at 6 feet above the sill of the Cauvery Dam, a large quantity of water for scouring, which, if attempted at that level, would very soon lower it. To avoid such a contingency, therefore, the 6½ feet limit was specified in Rule 1 as the level of water at which it was permissible to open the undersluices in ordinary seasons.

The water thus held up to be used for scouring, would tend to maintain the requisite level of 6 feet in ordinary times whenever there was a necessity for such scouring; hence it was that 6½ feet limit was fixed in Rule 1 and not 6 feet; the latter figure would have meant the lowering of the water level even below 6 feet, the required full supply level.

41. It should be noticed that 7 feet mentioned in Rule 3 refers to periods when the water in the river is low and the accumulation of sand naturally great, requiring also a larger head to wash out and this loss of water would have brought the level to the required 6 feet very soon.

Also, on account of the large accumlation of sand referred to above, the flow in the river would be much less than that it would have been at the indicated gauge under normal conditions in the absence of such a deposit of sand. This must also account for the increased depth mentioned in the rules.

In fact, these rules have reference more to the scouring requirements than to the higher limits of supply required for the delta.

42. *Rules of Regulation of 1896.*—The precise reason why the limit of 6 feet in the Rules of 1882 was raised to 7 feet in 1896 is given in paragraph 31, Part II, of the Madras case. Colonel Smart, who was responsible for this change, was of opinion "that the danger of overflooding being gone, it was better to risk accumulation of sand than to take a risk of not passing sufficient supplies to the Cauvery delta lands."

As he was so prepared to meet the extra sand deposits, it was natural that he should have arranged to allow a little more head of water not only to clear out sand when necessary, but also to make up for the reduction of effective head and the area of flood section.

As the requirements of irrigation between 1880 and 1896 were practically the same, the quantity that sufficed in 1882 must have also sufficed in 1896. So the

higher limit of 7 feet fixed in the Rules of 1896 cannot be taken to indicate a larger quantity of flow than what was represented by 6 feet in 1882 ; the extra limit of 7 feet can only have been fixed to make up for the extra accumulation of sand. Calculation shows that the effect of opening the undersluices even at 7 feet would bring down the level to about 6½ feet ; so the higher limit was fixed to make up for the very probable 6 inches of extra sand deposit. It has been admitted by Madras in paragraph 30, Part II, of their case, that the effect of opening the undersluices is to keep down the level of water by about half a foot, showing that 6 feet was really the limit of flow intended for the delta irrigation after making due allowance for scouring. The 6½ feet provided for in the Rules of 1882 was for preventing the sudden lowering of the usual full supply limit which would be caused by opening the sluices.

43. *Non-operation of rules.*—The rules have distinctly specified that at definite levels the sluices should be opened. No significance can be attached to non-operation of the rules mentioned by Madras in the same paragraph. If really more water was required than the rules provided for, the rules themselves would have been changed.

It has been shown that the 7 feet mentioned in the Rules of 1896 was really due to the silting up of the bed and not to increased requirements. Even if such increased requirements could be established by these rules, the claim is not of 20 years' standing.

44. *Proof from the 150 yards Kalingula.*—The crest of the 150 yards Kalingula, a surplus escape, was built at such a level as would allow water to escape into the Coleroon when the Cauvery Dam gauge reading exceeded 5½ feet. There will be a flow of 492 cusecs on the Kalingula when the Cauvery Dam gauge reads 6 feet, connoting a discharge of 18,850 cusecs. The resulting flow at the Grand Anikat would be (18,850—492=) 18,358 cusecs, thus, closely coinciding after making allowance for transmission losses, with the flow of 17,344 cusecs or 1,498 m. c. ft. per day, fixed at the Grand Anikat as " full and ample supply" in the Rules of 1888. These rules (Appendix C) for regulating the water at the Grand Anikat were in force up to the year 1894.

45. *Proofs from the Grand Anikat conditions.*—The two rivers, the Cauvery and the Vennar, form the head of the delta system and, any limit flow fixed at the head regulators of these two rivers should, therefore, represent the full requirements of the whole of the delta system. Thus runs clause 1 of the Rules of 1888 referred to above :—

> " A *full and ample* supply to the delta is considered to be passing when there is a discharge of 11,240 cubic feet per second into the Cauvery and 6,104 cubic feet per second into the Vennar."

This means a total of 17,344 cusecs or 1,498 m. c. ft., per day and represents a depth of 5·8 feet on the Cauvery Dam, which is very close to 6 feet insisted upon by Mr. Larminie. The small difference may be accounted for by transmission losses and the discharge over the 150 yds. Kalingula, already referred to.

46. *Meaning of the expression " full and ample" in the rules of 1888.*—If this supply was to be considered an average supply as now attempted to be explained by Madras in paragraph 45, Part II of their case, the words " full and ample" would not both have been used when the single word " average" would have conveyed the meaning. The combination of the words, " full and ample," cannot but denote the limit supply.

47. *Interpretation of other clauses.*—As regards the interpretation of the Rules 2, 3, 4 and 5, it should be remembered that there was no control over the floods at the Cauvery Dam when it rose above 6 feet on the gauge and Rule 2 lays down what should immediately be done when the flow varied within certain limits. In a rising river, the figures, 15,000 cusecs and 8,104 cusecs mentioned in Rule 2, indicate permissible discharges into the Cauvery and the Vennar in the initial stages. But if the water should still rise, as is indicated in Rules 3, 4 and 5, still higher discharges have been specified for the Cauvery and the Vennar, until a maximum difference of 4½ feet between the rear and the front gauges is reached.

Even in the Rules of 1905 and 1909, the levels at which the gauges are to be maintained, if possible, for full supply, are indicated as 4·5 feet in the Cauvery and 7 feet in the Vennar. This is equivalent to a discharge of 13,000 cusecs in the Cauvery and 7,830 cusecs in the Vennar represented by a flow of 6½ feet on the Cauvery Dam, after allowing for a discharge on the 150 yds. Kalingula and possible losses on the way. It is admitted by Madras that, after remodelling, greater facilities have been given to force large quantities of water into the delta and, therefore, previous to the improvement, the limits must have been smaller.

48. *Clause 1 of the Rules of 1888 is not merely an opinion.*—It is urged by Madras that the first rule of 1888 has no executive value and gives no executive direction. So far, it is easy to agree with Madras, because, even if it had been of an executive nature, it could not have secured such supplies from day to day. But Madras proceed to say that this was only of the nature of an expression of opinion. If it was meant that it is the opinion of the Madras Government in the Public Works Department, *i.e.*, of the Chief Engineer for Irrigation in his official capacity, who has approved of these rules, then surely even such an opinion is tantamount to an authoritative order by the Government of Madras regarding the maximum supply considered necessary for the delta irrigation. In matters of regulating discharges, the Chief Engineer usually represents Government and Madras cannot now go behind their own rules.

49. *Madras explanation of rules rebutted.*—The Madras Government add with reference to Rule 1 that the " full and ample" supply referred to therein " did not imply that the maximum useful supply of the very fluctuating flow available was at this rate but the average supply to be aimed at was based on these duties which connote 44 and 66 acres per cusec respectively." In the same paragraph, a passage from the Madras Cauvery project is quoted, which says that such low duties were contemplated for transplantation season only. If the flow due to such duties should be confined to that season only, there is no necessity for aiming at this duty in such a season, for they could have easily got even much lower duties if they had cared to keep the regulators open. On the other hand, if these duties of 44 and 66 acres per cusec were to be aimed at throughout the irrigation season, this would have meant a constant flow of 17,344 cusecs through the regulators which could never have been secured, as already noted ; and hence this figure can only be reasonably construed as the maximum flow necessary to give a full and ample supply to the delta irrigation and not the average flow. Other proofs adduced in this connection are corroborative of this conclusion.

50. *Rules of 1905 refer to flood season.*—It is distinctly admitted by Madras that the rules for the regulation of the Grand Anikat, dated 1905, chiefly refer to the action to be taken in times of floods. The fact that the supplies into the Cauvery and the Vennar have been fixed at 4½ and 7 feet, respectively, even in such a season although much larger quantities are available, clearly indicates that these are the maximum limits considered necessary. Even this corresponds to only 6½ feet over the Cauvery Dam.

But it has been admitted that much greater facilities have been created to pass excess waters into the delta system by the remodelling of 1902, than existed formerly, indicating that the previous limit was really represented by the 6 feet gauge. As the Madras Government base their prescriptive rights on the conditions that prevailed previous to such remodelling, it may be taken as fully established that the " full and ample" supply limits mentioned in Rule 1 of 1888 represented the limit flow which can be claimed as a prescriptive right against Mysore.

51. *Explanation of excess discharges through regulators.*—Appendix II put in by Madras shows occasions between the years 1900-08 when the supplies in the Cauvery and the Vennar were passed in excess of the full supply limits specified in the rules. But the rules which are intended for regulation during floods, distinctly provide for passing large quantities of water into the delta system when there is too much of it flowing at the Grand Anikat. These extra quantities must have been intentionally passed down the Cauvery delta system with the special object of reducing the flow into the Coleroon as far as practicable, to safeguard the Lower Anikat Regulators.

52. *Safety of Lower Anikat.*—In fact, Rule 3 of 1909 distinctly lays down that, in times of danger to the Lower Anikat, the limits of 4½ feet and 7 feet on the Cauvery and the Vennar, should be maintained even though the requisitions were for smaller quantities. These limits had naturally to be further increased whenever the flow in the Coleroon exceeded 13 feet on the Lower Anikat gauge, and, so, the mere fact that larger quantities were let down the Cauvery and the Vennar beyond the equivalent of 6 feet on the Cauvery Dam, does not lend support to the contention that the extra supplies were really wanted for the delta irrigation. The inference drawn by Madras from Appendix II, Parts II and III, of their case, cannot be accepted in the face of other more direct and unmistakable evidence, detailed above.

53. *Major Oakes' statement.*—Major Oakes has, in the year 1874, stated that, with 6 feet of flood at the Cauvery Dam, the water begins to pass over the crest of the Grand Anikat. The discharge above the head of the two regulators, the Cauvery and the Vennar, would then be 17,600 cusecs. This also coincides with what was considered "full and ample supply" to the delta according to the Rules of 1888, *viz.*, 11,240 into the Cauvery and 6,104 into the Vennar.

Any additional flow that might have been rendered possible by means of planks or falling shutters, could not be depended upon and therefore proper regulating shutters were provided in 1886. Even after this, the full supply considered sufficient was 17,344 m. c. ft. (*vide* Rules of 1888).

54. *Excess quantity admitted during floods is no criterion of actual requirements.*—It has been admitted that too much flood water was flowing into the Cauvery and Vennar prior to 1899 and much damage and loss was sometimes occasioned by water passing down them in excess of what those rivers were intended to carry. And so the regulation Rules of 1902 show the necessity for cutting off excess floods. But if the floods had been cut off to the exact requirements, *viz.*, 17,344 cusecs, the heading up at the Grand Anikat would have endangered the safety of the regulators and hence certain restrictions had to be placed for maintaining a definite maximum difference between the front and rear of the regulators. By this method more water than was necessary might have been purposely forced down the two rivers. But it was not required for irrigation; neither could it, from the nature of things, create a prescriptive right.

55. *Varying limits during the irrigation season.*—Having thus established that 6 feet represents the maximum limit requirements of the deltaic irrigation, the question remains to be examined, whether this maximum limit can be obtained during the whole of the irrigation season, June to January, or whether the varying conditions of cultivation, really require the same 6 feet limit flow throughout the period.

56. *Value of Metur Project Report.*—It is noteworthy that the Metur Reservoir project does not provide for a uniform flow throughout the irrigation period. The provision varies presumably according to the actual requirements of the crop, from a flow of 2·9 feet in June to 6·1 feet in July, gradually going down to 1·7 feet in December. Such a reduction is not due to any corresponding improvement in the distributary system and the consequent economical use of water. There is no provision for any such improvement in the project. If higher limits of flow be allowed as now claimed by Madras, a greater portion of it must be wasted.

Regarding paragraph 43, Part III of the Madras case, it is conceded that the forecasts in the project may or may not be realised in actual practice. But the project report makes references to important facts and statements by responsible officers with long and varied experience of the system and conditions of delta irrigation; and these cannot but be accepted as throwing valuable light on the question as to what limit flow is necessary in the height of the season and what variations may be reasonably made from month to month for meeting the really varying requirements of irrigation.

57. *Low limit of supplies considered sufficient for June.*—It has already been shown in the statement of the Mysore case (Exhibit My. 1) that practically no water is required for irrigation in the early part of June. The only new fact brought forward regarding the requirements of the supplies in June, is in connection with the water required for the first crop of the double crop area. But this area is very limited, being about 80,000 acres and the quantity of water required for this would

be 173 m. c. ft. at a duty of 40 acres and the allowance made by Mysore would be more than sufficient to meet this as well as transmission losses in the canals and distributaries. At all events, there is no justification for demanding the same limit in the month of June as in the months of July and August.

The tables given by the Madras Government on pages 13 and 14, Part III, of their case, have been developed by adding one more column and noting therein the surplus at the Lower Anikat on the respective dates. These tables (Appendix D) show that, in the first half of June, very much more water was wasted below the Lower Coleroon Anikat than that surplused at the Upper or Grand Anikat, though matters are somewhat improved in the second half as should be expected. It is also evident that all excess water admitted into the system has found its way into the Coleroon and the same will be the case in the future. From this it is clear that Mysore are justified in saying that the floods of June are mostly allowed to run to waste into the sea.

58. *Limits for other fortnights.*—For two other fortnights during the south-west monsoon, *viz.*, the second half of June and the second half of September, the requirements are also limited for reasons given in the Mysore Statement (Exhibit My. 1). It is only in the remaining five fortnights, from 1st July to 15th September, that the 6 feet gauge at the Cauvery Dam is allowable. This will be quite in agreement with the limits shown in the rules discussed above for regulation at the Upper and the Grand Anikats.

59. *Limits in the north-east monsoon.*—Mysore claim that whatever limits are fixed for different fortnights in the south-west monsoon, cannot, for obvious reasons, be made applicable to the north-east monsoon. The average duty obtainable in the south-west monsoon is about 50 acres, whereas the duty for the same area generally runs up to 200 acres in the north-east monsoon.

During the north-east monsoon, in the months of October to January, rainfall is much more abundant in the delta than in Mysore and the actual requirements of irrigation are also very much less than during the south-west monsoon months, as the transplantation season will have passed. In fact, Mr. Larminie has distinctly stated that the limit of 6 feet was to apply to only the south-west monsoon (*vide* passage quoted in paragraph 37 *ante*). Remissions have often been given for loss of crops due to too much water and consequent flooding during the north-east monsoon.

60. *Fair limits of flow suggested.*—The limits as now shown in the table below may, for these reasons, be accepted for the several fortnights, as against those previously proposed in the provisional rules presented to Arbitration Committee. The limits except for the period, July to 15th September, are, as already stated in the Mysore statement of case, fixed by allowing to 25 to 30 per cent over the Madras project supplies. And, as they were based on a consideration of the demand for 7 feet, they are doubly favourable to Madras, as it has now been proved that 6 feet really represents the limit supply and not 7 feet.

	M. c. ft.			M.c.ft.
June	450 1,060	October	1,240 1,240
July	1,625 1,625	November	1,000 696
August	1,625 1,625	December	538 290
September	1,625 1,120	January	290 290

A table has been attached to the rules (Appendix E) to show how the above limits are arrived at:

61. *Actual fortnightly averages compared.*—In this connection, a reference is requested to Appendix II of Sir John Benton's Note, dated the 12th May 1911, (Madras Exhibit Ma. 8-a, pages 46 to 48), which shows, first, that the fortnightly averages in many years have fallen much below the supplies allowed in the Metur project, and, secondly, that the fortnightly averages in other years are higher and, in many instances, go to as much as 2 to 6 times the project supplies. From this it will be seen that too much water has been thrown on the fields and wasted in

the latter case ; while, in the former, a much shorter supply than the project limits, though of a fluctuating nature, has not materially affected the area irrigated. Hence, the limits now allowed in the rules, with an extra provision of 25 to 30 per cent over the project limits as noted above, must be considered ample for all practical purposes.

62. *Total annual supplies and irrigated areas.*—Also, from Appendix VI of the same Exhibit (Ma. 8-a) it will be seen that the supply passed down the Cauvery Dam varied from 157,199 m. c. ft. to 349,395 m.c.ft. during the 20 years ending 1909-10. Notwithstanding an extreme variation of nearly 200,000 m.c.ft. which is equivalent to a full year's average supply, no great fluctuations are observed in the area irrigated which ranges from 940,000 acres to 1,010,000 acres. It is significant that, in the whole period of these 20 years, the largest area of cultivation, *viz.*, 1,010,000 has been secured with the very limited supply of 204,000 m.c.ft., only; while in a year, in which the supply was the largest, *viz.*, 349,000 m.c.ft., the area irrigated actually stood the lowest in the range, *viz.*, 929,819 acres, *vide* Appendix F. No better proof than this is necessary to show that an abnormal quantity of water is being thrown on the fields on account of the exigencies of flood regulation. This goes to swell the annual averages although no real benefit is secured.

Hence, the average of 210,920 m.c.ft. which the Mysore figures give according to the Madras computations (paragraph 25, Part III), compares very favourably with the actual requirements and would maintain irrigation intact without unnecessary waste of water. So the statement made by Madras that "disastrous results would necessarily follow the acceptance of the limit proposed by Mysore" is altogether exaggerated.

63. *Results in bad years.*—The Metur Reservoir project provides for an annual average supply of 190,000 m.c.ft., for the delta area. But, in the year 1899-1900, only 157,199 m.c.ft. was actually used as shown in Appendix VI of Sir John Benton's Note. So the limits must be fixed more with reference to the quantity of 157,199 m.c.ft. actually used than with reference to the 190,000 m.c.ft. that might be used. If it is shown that, even in a bad year, the withdrawal is confined to what runs to waste into the sea and that the limit flow fixed as necessary is not interfered with, there should be no objection against such abstraction.

If, before the remodelling of the Upper Anikat, the conditions of flow in some years were such as to necessitate remissions being given on account of insufficient supplies, the Madras Government should be prepared to give similar remissions in similarly bad years and should not demand from Mysore high limits of flow in order to avoid such remissions. Even in the worst year on record, *viz.*, 1899-1900, 45,000 m.c.ft. had to be "involuntarily surplused" at the Cauvery Dam although remissions were given on account of the insufficient supplies. Mysore wish to utilize only such waters as must be more or less wasted every year, including the very bad years, by devising suitable rules and methods for impounding.

64. *Computed flow due to suggested fortnightly limits.*—Fuller tables have now been prepared showing the daily and fortnightly flow that would have been available, under the limits proposed by Mysore, for the twenty years ending 1909-10. An abstract of these tables (Appendix G) has now been put in showing the fortnightly discharges that would have passed into the delta system, under the limits proposed by Mysore, as compared with those due to a limit of 6 feet throughout the season.

The annual quantities that have been actually used for the delta irrigation, according to Appendix V of Sir John Benton's Note (Madras Exhibit Ma. 8-a), have been shown in the same tables. It will be seen that the total flow due to the limits proposed by Mysore is, in all years, except one, prior to remodelling, greater than the quantity actually used. Only in the year 1896-97, there is a reduction of less than one per cent. Even after remodelling, when avowedly larger quantities of water are being used, the quantities due to Mysore limits do not vary appreciably from those actually used. This fact is sufficient to show that Madras interests will be adequately safeguarded by the limits of flow now proposed by Mysore.

65. *Allowance for rainfall.*—Madras admit that actual reductions of supply have been made on account of long continued floods or heavy local rain. In the months of July and August, such floods are frequent and in the north-east

monsoon, there is more or less continuous and heavy rainfall. During these periods, the claim for the full limit made by Madras is obviously untenable.

It is stated by Madras that 6 to 8 days is the limit of time that a single fall of rain of about 2 inches will render the canal supply unnecessary. If there should be another fall of rain within this interval, it will carry on to another period of six or seven days. From the rainfall statistics it can be shown that there are many such days when canal water would not be required. All that Mysore urge is that daily information should be given to them in the irrigation season, so that they may, on the basis of a quarter inch depth of water for each day, be able to regulate the discharge from the Kannambadi Reservoir. This will be useful to Mysore without any loss to Madras. Any slight mistakes made in extra impounding will only affect the supply from a very small portion of the catchment area above the Kannambadi Reservoir. The effect of such extra impounding will be still less in the north-east monsoon, when the rainfall on the reservoir catchment is very low, as compared with that on the delta area. Madras admit in paragraph 29, Part III, that certain substantial concessions due to rainfall may be given to Mysore in the north-east monsoon, but immediately withdraw the concession on the ground that it would not have been useful to Mysore in bad years. This may be true, but that is no reason why the benefit of really substantial storage in the north-east monsoon, should be denied to Mysore in good years, as such storage would be very useful for the hot weather supply in Mysore, as also to meet the demand of a possible succeeding bad year.

With some modifications due to the greater distance, the allowance for rainfall considered possible in the case of the Metur Reservoir project, can also be conceded in the case of the Mysore Reservoir.

Viewed in this light, the advantage of rainfall can be easily given to Mysore and a few years' observations specially conducted for the purpose will enable definite rules to be framed. But, as Madras insist that definite rules may be put in, a set of rules (Appendix H) is now suggested for examination and improvement by the Arbitration Committee. This is a matter in which the decision of the Arbitration Committee may be tentative.

Requirements of the Coleroon System.

66. *Requirements of Coleroon irrigation.*—Next, as regards the daily supply limit of 644 m.c.ft., for the Coleroon irrigation, it may be stated at the outset that this quantity was allowed to flow over the Upper Anikat, not because it was required for irrigation but because there was no means of controlling the flow in the river beyond 6 feet over the Cauvery Dam. The Cauvery Dam itself had been designed and built to secure this depth of flow which was considered sufficient to meet the full requirements of the delta irrigation. That the quantity above the 6 feet limit was going to waste has been clearly stated by Mr. Larmine, *vide* passage quoted in paragraph 37 above.

67. *The flow of 1 foot over the Upper Anikat unavoidable.*—This statement is corroborated by the fact that, after remodelling in 1902, the quantity of 644 m.c.ft., representing the equivalent of 1 foot flow over the Upper Anikat which was unavoidably running into the sea, has been effectively stopped. This shows that no good purpose would be served by passing this quantity into the Coleroon now. Also, it has been shown that the limit of 6 feet is all that is required for the delta and, with this limit at the Upper Anikat, there would have been no flow into the Coleroon before remodelling. The claim for 644 m.c.ft., now put forward, cannot therefore arise at all. It will also be presently shown that there is always ample flow at the Lower Anikat for all Coleroon irrigation whether or not any specific flow is allowed at the Upper Anikat.

68. *General considerations against the claim.*—The demand is also untenable having regard to the following considerations :—

(1) The total irrigation of the Coleroon system including the Veeranam tank is 110,000 acres, against nearly one million acres under the delta system ; and if, as shown already, a limit of 1,498 m.c.ft., per day

is enough for the larger area, one-ninth of this limit or 166 m. c. ft. per day, must represent the limit flow required for the Coleroon irrigation, if there were no other sources of supply to this system. It has been admitted by Madras in various passages in their own project report, already quoted in the Mysore statement of case (Exhibit My. 1, page 3, paragraph 11), that there is always an adequate supply in the Coleroon for the Lower Anikat system when the supplies in the Cauvery system are sufficient. Accordingly, the Metur project, even with its limited discharges, does not make any separate provision for the Coleroon irrigation.

(2) The accompanying statement (Appendix K) giving the comparative discharges of the Coleroon at the Upper, Grand and Lower Anikats, shows that, even in the worst years 1899 and 1905, although no water was admitted directly into the Coleroon at either of the two higher anikats during certain months, still the flow at the Lower Anikat was quite considerable. This could only be attributed to the excessive amount of water thrown into the delta system and the leakage finding its way into the Coleroon (*vide* columns 8, 11 and 13 of Appendix K).

(3) The full supply of all the channels taking off at the Lower Anikat comes to 190 m. c. ft., per day, which is very close to what was shown to represent the maximum requirements of the Coleroon irrigation, *viz.*, 166 m.c.ft. The demand for four times this supply is therefore obviously untenable.

60. *No special supply needed under altered conditions.*—The Madras Government admit in paragraph 13, Part III of their case, that what they want is a flow in the Coleroon " which will, under the *altered conditions*, fully secure the supply of their irrigation."

It is significant that Madras themselves recognise " that the conditions of the supply of the Veeranam tank are not such as to conduce to economy." It will be abundantly shown that any special allowance, in addition to the leakage which already finds its way into the Coleroon and the surplus at the two higher anikats, will be actually wasted.

Although this quantity of 644 m.c.ft., and more might have been unavoidably passed into the Coleroon to maintain the levels at the Lower Anikat before remodelling, shutters have since been specially designed and provided to prevent such unnecessary wastage. There is now no justification to subject Mysore to this wasteful burden, so long as it does not benefit the Lower Anikat system to any extent.

If this quantity of 644 m.c.ft., *per diem*, claimed simply because it was unavoidably included in the 7 feet limit before the remodelling of the Upper Anikat, did not, as admitted by Madras, help in replenishing the Veeranam tank previously, no claim can arise for such a flow now, particularly in the face of the evidence that it is not wanted at all under the altered conditions of the Lower Anikat.

Further, it is distinctly admitted that the old conditions at the Upper Anikat had grown so bad that they necessitated the remodelling. On account of the changes brought about by such remodelling, any right which might have existed before remodelling and which has not been exercised since, cannot now be claimed, to the prejudice of Mysore. The extra 644 m.c.ft., now claimed as necessary for the Coleroon irrigation, was not used prior to remodelling for the purpose for which it is claimed now.

70. *Interception of floods by the Mysore reservoir immaterial.*—Madras have stated that this flow of 644 m.c.ft., when available, is necessary for the Coleroon irrigation, because the Mysore reservoir will materially intercept the floods that at present contribute to the Coleroon flow. The Mysore reservoir is expected to utilize about 51,000 m.c.ft., per annum. This will be equivalent to about 35,000 m.c.ft. at the Lower Anikat making allowance for transmission losses. This is less than one-third of the average surplus at the Upper Anikat (*vide* Appendix VI of Sir John Benton's Note). Thus, the disturbance of the

flood conditions at the Lower Anikat will be very inappreciable. It is true that in bad years the surplus allowed into the Coleroon is not much. Even in such years the comparatively large amount of leakage from the delta area into the Coleroon cannot be prevented ; and this would be more than ample for the existing Coleroon irrigation. Also, Madras admit that the computations of discharges at the Agunda Cauvery are quite under-estimated so far as high floods are concerned. If due allowance is made for this, it will be seen that there would be no shortage of supply into the Coleroon on account of the Mysore reservoir even in bad years. In fact, the Metur reservoir which is more than double the capacity of the Mysore reservoir (90,000 m.c.ft., against 41,000 m.c.ft.) and intended to irrigate nearly three times the area contemplated under that reservoir, would stop practically all the surplus into the Coleroon. Also, the leakage from this new area to be irrigated by the Metur project being situated so far south of the delta area, would not be available for the Coleroon replenishment. With all this, no special provision, such as the 644 m.c.ft., now demanded, has been made in the Metur project for the Coleroon irrigation. Much cannot be made of the contention that the quantity impounded in the Metur reservoir would be at the call of the Coleroon irrigation, as such a call must necessarily mean that other lands directly dependent on the reservoir will be deprived of their regular supply. The natural inference from all this is that no separate supply is really needed for the Coleroon irrigation.

71. *Detailed examination of claim.*—The merits of this claim may now be discussed in detail. The total area under the Coleroon is distributed as shown below :—

	Acres
(*a*) Under the Vadavar channel	10,600
(*b*) Under the Veeranam tank partly fed by the Vadavar	52,000
(*c*) Under other channels	50,000

The claim for 644 m.c.ft, is made chiefly on the ground that it is wanted to replenish the Veeranam tank through the Vadavar even under the altered conditions prevailing after the remodelling of the Lower Anikat. It is therefore necessary to examine the question with special reference to the conditions of the Veeranam tank.

72. *Replenishment from the Veeranam tank catchment.*—The catchment area of the tank is 256 sq. miles. The average rainfall in the catchment is at least 36 inches, being the annual rainfall at Srimustnam, which lies at the head of the catchment, though there is a larger rainfall in the lower reaches of the area. Taking this as falling under class, designated "bad," Mr. Nethersole's curve shows an yield of about 15 m.c.ft., per sq. mile, which gives a total annual supply of 3,890 m.c.ft. This will irrigate about 15,000 acres, allowing 4 acres per m.c.ft., if there were no other source of supply to the irrigated area. But there is abundant rainfall, averaging up to about 54 inches per annum, in the area fed by the tank. It is well known that rice crop flourishes on natural rainfall, that is, without any storage facilities, if the annual rainfall is 60 inches or more. If due allowance is made for this, the replenishment from the catchment would be sufficient for at least double the area or 30,000 acres. The total irrigation of the Veeranam tank being 52,000 acres, the balance of about 22,000 acres can easily get its supply from the Vadavar. The Vadavar has to maintain 10,600 acres by direct irrigation ; the irrigation dependent on the channel will then amount to 32,600 acres.

73. *Net supply needed through the Vadavar.*—Taking an average duty of 70 in consideration of the heavy rainfall, the flow required for this area of 32,600 acres, is 465 cusecs, against 450 cusecs, the capacity of the Vadavar at the crest level of the Lower Anikat before it was remodelled. But the anikat crest level has been raised by 2 feet by means of shutters and the discharging capacity increased to 1,070 cusecs. So a discharge equal to about two and a half times the quantity actually required to meet all irrigation demands including that under the Veeranam tank, can be passed through the Vadavar without the necessity for lifting the gates of the anikat, as indicated in the table on page 14 of Part II of the Madras case.

74. *Interpretation of rules.*—Even in the rules in force for the regulation of the Lower Anikat prior to remodelling in 1899-1902, the full supply level was

recognised as being at 1·5 ft. over the crest of the Lower Anikat. This corresponded to a flow of 935 cusecs. This quantity is increased to 1,070 cusecs after remodelling. There can therefore be no doubt that all the water needed for the Vadavar could be easily secured without the necessary waste of water which would be caused by lifting the gates, as argued in paragraphs 37 to 42, Part II of the Madras case.

75. *Irrigation will be unaffected whether the tank filled or not.*—It may be argued that the capacity of the tank is small and it cannot take in all the water from the catchment although the yield is sufficient to fill the tank about four times. The capacity of the tank is no criterion to meet the irrigation dependent on it as it fills many times over in the year and acts merely as a balancing reservoir, taking in occasional floods as they come in and giving out the same for direct irrigation as required. A reference to Appendix IV attached to Part II of the Madras case makes this quite clear.

From this it will be seen that the contention of Madras that the area of irrigation depends mainly on the replenishment from the south-west monsoon cannot be sustained. An abstract of Appendix IV put in by Madras is attached (Appendix L), showing very clearly that, in some years such as 1893-94, 1894-95, 1906-07, 1907-08, when the tank is not shown to have filled in the south-west monsoon, the irrigation did not suffer. In fact, even if any small replenishment is necessary through the Vadavar, the leakage water available in the Coleroon would be more than sufficient for all such requirements (*vide* columns 8, 11 and 13 of Appendix K).

76. *Inferences from certain Madras statements.*—According to their statement in paragraph 38, Part II of the Madras case, a supply of 25,674 cusecs was required in the Coleroon before impounding into the Veeranam tank could begin. This quantity connotes a depth of 7·6 feet on the Cauvery Dam gauge. So the total flow in the river should then be 25,674 cusecs over the Upper Anikat and 31,598 cusecs on the Cauvery Dam, or a total of 57,272 cusecs (4,938 m.c.ft. per day). Under these conditions, the number of days in which the Veeranam tank could have got its supply is 46 in 1903, a good year, and only four days in 1905, a bad year.

Another striking statement made in connection with the Vadavar flow is that the Veeranam tank requires 107 days to fill, when the Coleroon discharge is 31,048 cusecs. This corresponds to a gauge reading of 8·2 feet on the Cauvery Dam and a total discharge in the Agunda Cauvery of 68,000 cusecs (5,335 m. c. ft. per day). Even in the best year on record, such a large quantity of flow was obtained for only 40 days, against 107 days stated to be required to fill the Veeranam tank through the Vadavar. From all this it is clear that the claim put forward for an extra flow of 644 m.c.ft., *per diem*, mainly on the ground that it is required for filling the Veeranam tank, is quite untenable.

77. *Every remodelling has tended to reduce replenishment from floods.* —In the second remodelling of the Lower Anikat, the sill of the regulating gates was lowered by 2 feet. The alterations effected made it more difficult for water to pass through the Vadavar with the same levels as before remodelling. The lowering was done to create facilities to pass down high floods. If such high floods were really necessary for replenishing the Veeranam tank through the Vadavar, this remodelling would have been done by raising the regulator sills instead of by lowering them.

In fact, every remodelling of, or improvement to, the Grand Anikat or the Upper Anikat, tended to reduce the ordinary supplies into the Coleroon and, as admitted in paragraph 41, Part II of the Madras case, the remodelling has also created facilities for passing down the flood water at a considerably lower level than before. This shows that, neither in the flood season nor at other times, was any special allowance made, nor was found necessary, for the replenishment of the Vadavar at a high level. The inference from all this is that no direct flow into the Coleroon is necessary to replenish the Veeranam tank and what little may be required occasionally, is all obtained from leakage.

Section iii.—Use of the Hot Weather Flow.

78. *Use of the hot weather flow.*—The claim for a constant flow of 900 cusecs in the hot weather, that is, from March to May, now put forward by Madras, is not

based on any prescriptive right, The natural flow has been known to go down as low as 90 cusecs near Sivasamudram. It will be perfectly open to Mysore to utilize the hot weather supply for any purpose needed by them, whether for power or for irrigation. There is no hot weather irrigation in the Madras portion of the river at present. The Madras Government have, in the previous correspondence, definitely and without reservation, waived their claim to the hot weather flow. This attitude is also confirmed by a statement made in paragraph 2 of a note dated 15th November 1910, by the Superintending Engineer on special duty, Madras. Even if the waiver is now withdrawn, they are only entitled to the natural flow of the river after the customary Mysore requirements are satisfied. But the interception at the reservoir of the small flow in the hot weather will be more than compensated for by the artificial increase of the river flow below Sivasamudram, which will be caused by the power works as well as by the tail water from new irrigation.

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Exhibit My. 8.

PART III.—PLACE AND MODE OF MEASUREMENT.

SECTION i.—THREE ALTERNATIVE SITES FOR MEASUREMENT DISCUSSED.

79. *Place and Mode of Measurement.*—Any rules that might be framed for the proper regulation of the supply to which Madras has a prescriptive right, must have reference to—

(1) the place where such measurement may be rightly and justly made, and
(2) the actual method of regulation and adjustment of the supplies.

80. As regards the place of measurement, three alternatives have been considered:—

(*a*) At Sivasamudram as originally demanded by Madras when negotiations were first opened with that Government.

(*b*) At the three anikats across the Cauvery, the Hemavati and the Lakshmanatirtha above the site of the proposed Mysore reservoir and on the Hulhalli anikat across the Kabbini.

(*c*) At the Cauvery Dam (Upper Anikat).

81. The Sivasamudram anikat has been condemned by the Inspector-General of Irrigation and Assessor as being quite unsuitable for gauging flood discharges accurately and need not be further considered; and, even if any other anikat could be improved or constructed in the vicinity and made suitable for such a purpose, it would deprive the Durbar of the credit due to them in respect of the ample replenishment from about 5,000 square miles of catchment, comprised in the Arkavati and the Shimsha basins in their own territory; and it will also raise the question of the further allowance due to the Durbar on account of intermediate replenishments up to the Cauvery Dam. The latter can never be solved to the satisfaction of both the parties.

82. The second alternative now put forward by Madras, will render matters still more unfavourable to the interests of Mysore.

The catchment area of the Cauvery basin above the four anikat sites proposed for gauging is 4,500 square miles, which is only about three-sevenths of the total catchment comprised in the Province (11,500 square miles) and one-sixth of that at the Cauvery Dam (27,000 square miles). It would be most unfair to demand from this small catchment the full flow due at the Cauvery Dam from six times that area. This single reason, if nothing else, puts this proposal out of court. The injustice of such a demand is intensified when Madras asks in addition to the discharge represented by the seven feet limit, a high percentage addition for transmission losses due to various causes, as if there was absolutely no replenishment in the river valley below, at least to make up for such losses.

83. *Replenishment from the intermediate catchment.*—The question of the intermediate replenishment in the several more important tributaries may now be closely examined.

First, taking the Arkavati and the Shimsha rivers, in a printed note forwarded to the Madras Government through the Hon'ble the Resident in March last, it has been clearly shown from the computed discharges at Sivasamudram and the Bhavani Bridge, that, even in the very worst seasons, there is a replenishment equal to 1·5 per cent of the total contents of the Mysore reservoir and in a good year the reservoir would fill nearly 1¾ times out of the flow of the two rivers, the Arkavati and the Shimsha. It should be remembered that the catchment area of the two rivers is only about 5,000 square miles with a rainfall of less than 30 inches.

It has recently come to notice that the discharges at Sivasamudram were much over-estimated on account of the weirs not being suitable for gauging flood discharges. The recent velocity observations below the Dhanakere anikat have

confirmed this fact. Also, it is understood that the Bhavani discharges, in high floods, are under-estimated. With this fresh information, the computations based on the excess of the Bhavani discharges over the Sivasamudram discharges would make this intermediate replenishment from the Arkavati and the Shimsha much higher than what has been indicated above.

84. *The Bhavani, the Amaravati and the Noyel.*—So also as regards the replenishment from the comparatively large rivers, the Bhavani, the Amaravati and the Noyel, no definite information was previously available for Mysore and the Madras Government merely stated then that these rivers did not contribute any appreciable replenishment during bad years. It has been admitted by Madras that, in the north-east monsoon, the Cauvery flow is mostly dependent on the plain catchment in the Madras area and also on the catchments of the Bhavani and the Amaravati. The Bhavani gets a fairly good supply from both monsoons. From the discharge statements appended (Appendix M), it will be seen that even in a very bad year, like 1905, the total contribution from these three tributaries came to 79,993 m.c.ft., out of a total supply at the Cauvery Dam of 241,344 m.c.ft. This represents about one-third of the total flow in the Cauvery basin and twice the capacity of the proposed Mysore reservoir. And here it may be mentioned that the anikat referred to on the Bhavani is about 40 miles, that on the Amaravati, 30 miles, and that on the Noyel 80 miles, above their respective points of confluence with the main river; and if account be taken of the additional replenishment due to the lower areas, the total supply from these tributaries would really be a very considerable quantity.

	Year 1905.
Bhavani	76,131 m.c.ft.
Amaravati	2,954 ,,
Noyel	908 ,,
Total	79,993 ,,

To this must be added the replenishment direct into the Cauvery from all the rest of the catchment area both in Mysore and Madras territories, below the four higher anikats selected for measurement by Madras to gauge the discharges.

85. *Measurement at Cauvery Dam, the only solution.*—The Madras proposal cannot therefore be accepted as it would be highly unjust to Mysore to deny the benefit of all the material intermediate flow contributing to the total discharge at the Cauvery Dam. The same remarks would more or less apply to the selection of any point for measurement higher than the Cauvery Dam, where the supplies to the delta are due.

These considerations make it clear that the third and last alternative, *viz.*, fixing the place of measurement at the Cauvery Dam, is the only suitable solution having regard to all the circumstances of the case. The gauging operations at the dam have been carried on for many years past and the exact limits of gauge reading required for full supply during the several fortnights can be definitely ascertained. In paragraph 23 of Part III of their case, Madras have given the precise reasons why the gauging point for measuring their supplies should in the opinion of Mysore be made at the Upper Anikat.

And what is more, the replenishments from the large catchment between the Upper Anikat and the Kannambadi Dam can only be exactly accounted for at the Upper Anikat. For, the difficulty of computing the gains due to such replenishment has been admitted to form the most complex problem for solution by the Arbitration Committee, so much so that it may either make or mar the stability of the Madras irrigation or ensure or destroy the success of the Mysore Reservoir (paragraph 35, Part IV of Madras case).

86. An independent check to verify the quantity actually passed down will be needed as the Cauvery Dam was built merely as a grade wall in the bed of the Cauvery. Its crest is often silted up with varying depths of sand from day to day. It therefore follows that the quantity of flow indicated by the same gauge reading on different days will be dissimilar. Certain empirical rules appear to have been framed (as the result of velocity observations made in the year 1909) for determining the actual flow on any day according to the state of flood in the river. The computation of the exact quantity of flow each day, even according to these rules, will require to be checked from time to time by further observations. But the necessity for this is obviated by the existence of the Grand Anikat, 20 miles below, where the head works of the two main branches, the Cauvery and the Vennar,

feeding the whole delta are situated and the actual discharges from day to day 269
from fortnight to fortnight can be easily measured at the regulators of these canals. This practical and ready means of verifying the actual discharges may therefore be adopted.

87. It is admitted that the flow from the Western Ghauts in the south-west monsoon forms a good portion of that at the Cauvery Dam. Although the exact flow on any particular day cannot be predicted with accuracy, the proportionate flow of the western area, say at the Kannambadi reservoir, to that at the Cauvery Dam, can be fixed for the south-west monsoon with some degree of approximation and the proportion may be used in formulating rules. These rules with working tables are dealt with in the sequel.

Section ii.—Necessity of Treating Proposed Rules as Tentative.

88. *Proposed rules to be tentative.*—It is impossible to evolve satisfactory rules at once from the incomplete data in the possession of the two parties. Also, these data were not collected with the particular end in view. For this reason, the Durbar have been consistently maintaining that any rules framed now may be only tentative for some years, so that they may be improved with the benefit of experience gained in the interval. The tentative period suggested by the Durbar was only six years, while Sir John Benton thought that the term was too short considering the difficulty and complexity of the operations involved and advised that twenty years might be adopted. It is open to the Committee to fix any period they think reasonable for the purpose. Gauging stations as provided in the rules may be established with a view to determine the relation of the discharges at the various points in the course of the river.

With this information and with special telegraphic facilities, there will be no difficulty in regulating the supply from the Mysore Reservoir to a nicety.

89. *Remarks on Part IV of the Madras case.*—The Madras Government also agree that the rules must be tentative in the first instance, although they have, in Part IV of their case, attempted to make some approximate computations, regarding transmission losses and the time of transmission. These of course cannot be held as conclusive and further observations are necessary. Some general remarks are offered below regarding the more important points raised in this part of the Madras case.

Transmission losses.—Paragraphs 36 to 56 deal only with transmission losses between Sivasamudram and Cauvery Dam; but this question has been very much complicated by mixing up the draw-off for intermediate irrigation with the real transmission losses. If due allowance be made for this factor, the real transmission losses will be found to be much less.

Madras computations for transmission losses.—Paragraphs 56 to 62.—Computations for real transmission losses have been based on the result of the observations taken at the Dhanakere anikat for the short period of about 50 days. This is by no means sufficient or conclusive. Mysore are agreeable to continue these observations to arrive at correct results. These observations should be made between several reaches of the river mentioned in the Mysore rules, so that the total gain or loss in transmission between Kannambadi and the Cauvery Dam may be ascertained as correctly as practicable.

Time of transmission.—Paragraphs 64 to 71.—No definite observations have been made with the special purpose of finding the exact time required for the Kannambadi water to reach the Cauvery Dam and any inferences drawn from the existing data collected for quite a different purpose cannot be expected to give satisfactory results. Here also, special observations are necessary and it is hoped that the velocity and discharge observations suggested in the Mysore rules, if carefully computed and plotted on proper diagrams, would easily settle this question.

90. *Points to be held tentative.*—The Mysore Government agree that the question of the prescriptive rights of Madras should be finally settled now. The principle of measurement and the rules for working the reservoir and the limits of water necessary for meeting the prescriptive rights of Madras should also be definitely determined now.

91. The factors affecting the working of the rules which may be held tentative, are enumerated below :—

(*a*) The proportion which the flow at the Kannambadi reservoir bears to that at the Cauvery Dam in the south-west and north-east monsoons, respectively.

(*b*) The percentage, if any, to be allowed for transmission losses.

(*c*) The interval of time necessary for the flow at Kannambadi to reach Cauvery Dam.

(*d*) The quantity of water required for intermediate irrigation, and

(*e*) The replenishment from all the intermediate catchment area.

These must be ascertained after careful observation and any figures which may now be fixed for any of these items, should be held tentative and subject to revision after the results of the special observations, now to be started, have been determined and accepted by both the parties. The methods by which such computations have to be made from the data collected, may now be settled to avoid any possible future differences.

SECTION iii.—REMARKS ON THE MODE OF MEASUREMENT PROPOSED BY MADRAS.

92. The Madras Government have considered all the three systems of working the reservoir hitherto put forward, namely :—

(*a*) System proposed by Mysore.

(*b*) „ „ by Madras.

(*c*) „ „ by the Assessor.

At the outset it should be stated that, with the additional information now available, Mysore have slightly modified the system of water regulation previously proposed and upon which the Madras Government have based their remarks in part IV of their case.

The defects shown by Madras in the working of the Mysore system have arisen from the omission of the admittedly " difficult question concerning loss in tranmission on compensation water ;" and taking the losses into account, a new set of tables on the basis of table N put in by Madras has now been prepared (Appendix N). From this it will be seen that most of the defects pointed out in the Madras case can be eliminated, while the storage facilities to Mysore have also been improved.

93. The system proposed by Madras gives prominence to the losses in transmission. Although the gains are also admitted, no account is taken of them in fixing the quantity due to Madras. It leaves out of consideration the abundant replenishment from a large portion of the catchment area, both in Mysore and Madras, lying between Kannambadi and Cauvery Dam which will be very serviceable for impounding in Mysore. Mysore will not get under this system the supply they are justly entitled to under the Agreement of 1892, and no further remarks are therefore called for.

94. The third system depends upon the proportion which the flow at Kannambadi bears to that at the Cauvery Dam, an assumed figure; the impounding at Kannambadi is to be confined to the excess flow over the quantity due at the Cauvery Dam reduced in that proportion. By this method, the facilities for impounding are unnecessarily restricted as will be shown under section iv below.

95. *New irrigation above the Cauvery Reservoir.*—In paragraphs 76-77, Part IV of their case, Madras have made some remarks on the proposed new irrigation above the Kannambadi Reservoir.

It may be stated that such irrigation is only proposed under the existing anikats and the Agreement of 1892 gives full power to Mysore to do so. But Madras apprehend that this will be indefinitely extended by the help of the reservoir and the way in which such help would be given to the upper area has been ingeniously conceived by Madras. They consider that, as the quantity of natural flow above the reservoir site is limited, it is insufficient to meet all the existing irrigation and therefore there is no scope for any further extension.

96. This is not a fact. It is true that, during the past 10 years, Mysore has not been able to extend the river irrigation ; but that was due to the demand for water for power when the river is low, just at the time when the standing crop also requires a supply. As the reservoir fully provides all the water needed for power supply, the conservation of water for power purposes would no longer be necessary and it would be possible to extend irrigation out of the water so set free.

Also, Kannambadi reservoir in its second stage submerges about 8,000 acres of wet land and the water thus set free becomes available for extension of irrigation above the reservoir.

It is expected that the water from these two sources would be sufficient for the extension of irrigation above the reservoir now proposed. There is no room for thinking that all the natural flow required for 40,000 acres of irrigation below the reservoir would be substituted by the supply from the reservoir and that the natural flow thus set free would be utilised in indefinitely extending the irrigation above the reservoir site.

When, however, any extension becomes necessary after the reservoir is built, beyond the limits possible out of the natural flow, the extra water due to such extension will be duly allowed for, and added to, the quantity drawn off from the reservoir. With this assurance, there need not be any apprehension regarding the extension of irrigation above the reservoir against the interests of Madras. This also answers the point raised in paragraph 77 of the Madras case.

97. It must be remarked that Mysore would be similarly put to unnecessary loss if Madras increase the area of irrigation in the Cauvery basin above the Upper Anikat directly on the Cauvery or on any of its tributaries, for this would increase the transmission losses now tentatively calculated on a basis of 96,000 acres of such intermediate irrigation. It is therefore necessary that due allowance should be made in favour of Mysore for the water consumed by such extension of irrigation and that limit flows that may be now settled as due at the Cauvery Dam, will have to be correspondingly reduced.

Section iv.—Mode of Measurement proposed by Mysore.

98. The Arbitration Committee have desired that information on the following point may be collected.

> "What proportion of the volume of water measured at the Upper Anikat may reasonably be assumed to be due to that portion of the whole catchment area which would be intercepted by the Kannambadi reservoir."

99. This question has been examined by Colonel Ellis in a note accompanied by diagrams. He has also furnished, to the Assessor, a further note with working tables showing how this proportion between the total flow at the Kannambadi reservoir to that at the Cauvery Dam, can be applied, to regulate impounding in the Kannambadi reservoir. He has shown that the system may prove acceptable to Madras under certain conditions. This of course is irrespective of the interests of Mysore, as the tables he has prepared show that the Mysore reservoir will not fill. He has also suggested that a proportion of 0·8 might be tried for the south-west monsoon and a smaller proportion, 0·5 for the north-east monsoon.

100. It will now be examined how this mode of impounding will affect Mysore interests; and how the proportion of the flow at Kannambadi to that at Cauvery Dam can be made applicable in the present case to secure the interests of both the parties. Even if a proportion more favourable to Mysore were taken, or if the average proportion, say for 5 or 10 years, instead of that for the worst year, be fixed, the impounding conditions cannot be improved. If a limit flow up to, say 6 feet (1,625 m.c.ft., per day), is to be fixed as the standard demand at the Cauvery Dam, and if Mysore is asked to reserve a proportionate flow, say 0·6 of 1,625 m.c.ft., or 975 m.c.ft., every day, and store only the excess quantity available at the Kannambadi Dam site, Mysore would still be placed in a very unfavourable situation. It has been found that there would be very few days when the discharge from the limited catchment area above the Kannambadi Dam site would exceed 975 m.c.ft..

particularly in bad years; in the year 1899, there were only 26 such days and in 1905—37 days. The limitation of impounding to so few days will really prove very unfavourable to Mysore.

101. To show this, a specimen working table (Table I, Appendix P) has been prepared for 1905-06, which was one of the bad years, with limits of flow for the different fortnights allowable at the Cauvery Dam as provided in the rules proposed by Mysore. Column 7 of the table shows that, in the month of July alone, as much as 25,275 m.c.ft., would have been wasted into the sea even after satisfying the requirements of Madras. The whole or a greater portion of this could have been stored without the least injury to Madras, as the flow at the reservoir site was quite abundant, being 60,968 m.c.ft., against only 24,082 m.c.ft., stored according to this method. Also, it will be observed from column 8 that, even with such a restriction on storage and so much waste of water into the sea, the Madras supplies have fallen short of the requirements on 2 out of 31 days, while no compensation is due from Mysore for such a shortage. This shows that the system of proportionate storage would not prove entirely acceptable to Madras and much less to Mysore, as so much water reserved out of the Kannambadi flow would be wasted.

102. The effect of such restriction on Mysore will become quite apparent if the question is viewed in the light of the irrigation requirements. The demand that Mysore should reserve at Kannambadi 0·6 of the flow required for the delta irrigation is tantamount to saying that the flow above Kannambadi should be made responsible for the irrigation of 0·6 of 1,100,000 acres, *i.e.*, for 660,000 acres, before Mysore would be allowed to impound. Mysore propose to irrigate by their reservoir, in its ultimate stage, about 150,000 acres which is less than one-fourth of the above area, *viz.*, 660,000 acres, for the water-supply of which Mysore would be made responsible to Madras. In fact, this would mean that Mysore will be allowed to build their reservoir provided they can show that there is sufficient water at the reservoir site, not for the 150,000 acres which the reservoir is intended to irrigate. but for more than five times this extent, *viz.*, 660,000+150,000 or 810,000 acres. Such a restriction will obviously prove detrimental to Mysore interests, particularly as a very large quantity of water not made available for impounding in the reservoir would run to waste into the sea.

103. But the avowed object of the Mysore reservoir is to utilise all such wastage without interfering with the Madras prescriptive rights in any way. Some means will have to be devised so as to make it possible for Mysore to store and utilise the flood waters as far as practicable, as the right of Mysore to such waters is admitted on all hands.

To show the possibility of doing this, the accompanying Table II of Appendix P has been prepared. According to this, the quantity of flow up to the prescribed limits each day will be left intact. When the discharge exceeds these limits, the balance, which only runs to waste, is considered available for storage in the reservoir, This quantity is converted into its equivalent at the Mysore reservoir site by adding for transmission losses. The impounding at the reservoir is limited to this quantity if available at Kannambadi. A comparsion of the Tables I and II makes it quite clear that the method indicated in Table II is more favourable to Mysore than that of Table I, without the least prejudice to the prescriptive rights of Madras. The following comparative figures for the month of July 1905-06 are given from the two tables for ready reference:—

	Table I.	Table II.
Total quantity of flow at the Kannambadi dam site ...	60,968 m.c.ft.	60,968 m.c.ft.
Quantity available for storage ...	34,082 „	50,147 „
Quantity wasted into the sea ...	25,275 „	13,306 „
Number of days of shortage in Madras supply ...	2	nil

These figures speak for themselves. In Table II the quantity wasted into the sea is remarkably reduced by fully 50 per cent, while the quantity available for impounding in Mysore is increased by as much as 16,000 m.c.ft., or 40 per cent of the total capacity of the reservoir. By this method the interests of Madras are left perfectly intact, while those of Mysore are also safeguarded by affording facilities for storing more of the excess flood waters than under the first method.

104. The only difficulty that may arise in actually working out the system of impounding as shown in Table II, would be due to the fact that the quantity of flow at the Cauvery Dam each day will not be known beforehand at the time of impounding in the Kannambadi reservoir. Here the information called for by the Arbitration Committee regarding the proportion which the flow at Kannambadi bears to that at the Cauvery Dam, would be really serviceable.

By multiplying the known flow at Kannambadi on any day by the ratio determined, as noted above, the corresponding flow at the Cauvery Dam 2 or 3 days later can be approximatley found and this figure may be taken for computing the surplus at the Cauvey Dam above the Madras requirements. This surplus quantity converted into its equivalent at Kannambadi by adding for the transmission losses would be taken as permissible for impounding on that day in the reservoir. On this principle, Table III of Appendix P has been prepared. A reference to it will make it clear that this gives a working basis to the system shown in Table II. It will be seen that for the same month, July 1905-06, the total quantity made available for storage is 49,693 m.c.ft., against 50,146 m.c.ft., according to Table II; and the total flow wasted into the sea would be 14,833 m.c.ft., against 13,306 m.c.ft., as per Table II. There are only 2 days in this month in which a disturbance within the limits due to Madras has at all occurred. The quantity affected by this disturbance is only 1,078 m.c.ft. against a total flow of 91,688 m.c.ft., at the Cauvery Dam. In fact the quantity of compensation water due to Madras is confined to a minimum of only 1·1 per cent of the flow and so the effect of the delay of 2 or 3 days in transmission is only felt on this limited quantity.

105. The same Table III has been worked out for the whole year 1905-06, and the results derived from this are worth noting. The number of days in which impounding is at all possible is only 54 in the whole year and so any disturbance in the incidence of flow at the Cauvery Dam would only be confined to this limited period; on all other days, the quantity received into the reservoir would be let down immediately. Even out of these 54 days in which the flood conditions have been disturbed, impounding above the permissible surplus quantities has been made during 23 days only. Also, the total quantity of water requiring adjustment on these days is only 6,632 m.c.ft; of this, the quantity actually adjusted (amounting to 3,503 m.c.ft., or $\frac{1}{2}$ of the quantity disturbed) really proves beneficial on 15 days to Madras, as it goes to enhance the natural flow at the Cauvery Dam when it is below the required limit. So the balance that really affects the incidence of flow is (6,632—3,503)=3,129 m.c.ft. This is only 1·3 per cent of the total flow at the Cauvery Dam in the irrigation season and is confined to only 8 days in the whole period. This small disturbance cannot be considered as in any way affecting the irrigation conditions of the delta system.

106. Similar Tables I, II and III, have been worked out for the current year 1913, with the correct observed discharges and it will be seen that they also confirm the above conclusions.

In both these sets of tables, the proportion of Kannambadi flow to the Cauvery Dam flow is taken as 0·625 for the south-west monsoon and 0·33 for the north-east monsoon. These ratios are based on the actual discharges for the five most unfavourable years in each season respectively.

107. *Conclusion.*—Thus, by approximately computing the daily discharges at the Cauvery Dam from the observed discharges at Kannambadi, a method of utilising as far as possible the surplus waters at the Cauvery Dam for impounding at Kannambadi has been devised as per Table III by the help of the proportion which the flow at one place bears to the other. It is also shown how the information called for by the Arbitration Committee about this proportion will prove useful in determining the principles and rules for impounding at the Kannambadi reservoir the wasted flood-waters at the Cauvery Dam, in a way fair to both the parties—to Madras, in leaving both the quantity and incidence of flow undisturbed—to Mysore, in allowing facilities for impounding all surplus waters which now run to sea and to which they have the first right by common consent.

APPENDIX A.

No. 1—A.

OFFICE OF THE DEWAN OF MYSORE,
Camp Guindy, Madras, 10th June 1890.

From

K. SHESHADRI IYER, ESQ., C.S.I.
Dewan of Mysore.

To

COL. SIR OLIVER ST. JOHN, K.C.S.I.,
Resident in Mysore.

SIR,

With reference to the previous correspondence on the subject of the restoration and construction of irrigation works in the Mysore State, commencing with your office letter No. 2963—818 of 31st August 1888, and ending with your office letter No. 1275 of 19th April last, regarding the Jailodu tank, I have the honor to submit herewith the accompanying Memorandum, which embodies the views of the Durbar regarding the storage of water in Mysore Territory.

2. Very early in the present century, exception appears to have been taken by the Government of Madras to the utilization by the Mysore Government of the waters of the river Cauvery and its tributaries. See letter dated, Fort St. George, 14th February 1807, from the Chief Secretary, to Major Wilks, then Acting Resident at Mysore, and latter's reply dated 27th March of the same year. In this correspondence, the rights of Mysore to the improvement of their river-works, so far as the same should not prove detrimental to the then existing irrigation in the Tanjore Delta, would appear to have been recognized.

3. And it is believed that, about the year 1870 or 1871, controversy again arose in regard to the extension of the Cauvery channels in Mysore, such extensions conflicting with the claims of the Madras raiyats irrigating lands lower down the banks of the river. The correspondence that then ensued cannot, however, be traced in the records of this office though it is believed that the dispute was settled in favour of the Mysore raiyats.

4. But, be that as it may, it is clear that, from the year 1866, a policy was inaugurated by the British Government which aimed not only at the complete restoration of all the ancient irrigation works, which covered the Mysore plateau, but at their improvement and extension on a great scale, so as to fully secure the whole of the Territory against drought and famine.

5. The restoration of the so-called "Tank-system" of Mysore, embracing, as it did, the utilization of the maximum of rainfall over the country, so far as the same could be economically ensured, was, as the records show, fully approved by the Government of India and Her Majesty's Secretary of State, and was never objected to, so far as the Durbar are aware, by the Madras Government.

6. This far-reaching scheme was unfortunately but very partially carried out from various causes, chief amongst which was the disastrous Famine of 1877-78, which put a stop for a time to all but the most insignificant and least costly public works. The incomplete tank-scheme was left as a legacy to the Government of His Highness the Maharaja, and the irrigation works, which the Durbar have been carrying forward during the last 10 years, are but the fulfilment of the original intentions of the British Government.

7. Through your kind instrumentality, a Conference between the Madras Government and the Durbar was recently attempted, the object being to establish a basis on which all tank and channel questions could be settled as they arose, in

fairness to Madras raiyats on the one side, and in justice to those of Mysore on the other. It was the earnest desire of the Durbar that such an arrangement should be arrived at as would be best calculated to avert the consequence of serious loss to the British Government, without checking the ligitimate and reasonable progress of the irrigation works of Mysore. Unfortunately, the conditions put forward verbally at the Conference on behalf of the Madras Government with the object of limiting the rights of Mysore appeared to be such as would preclude all but the most insignificant works of restoration and improvement, and would, in fact, absolutely prevent the protection of the country from drought and famine by means of the extension of our existing irrigation system. The restrictive limits proposed were, in the opinion of the Durbar, unreasonable and could not be accepted.

8. Under these circumstances, a representation to the Government of India has become necessary, and I am to express the hope of His Highness the Maharaja that you will be so good as to urge, on behalf of the people of Mysore, the cogency of the reasons set forth in the accompanying Memorandum, and to obtain for the State reasonable liberty to carry out its irrigation works and to complete its system of irrigation as early as possible. The works so far undertaken, or now under projection, by the Durbar, will not, it is believed, materially affect existing irrigation works beyond the frontier. Objections from Madras authorities have always received, and will always continue to receive, due and respectful consideration from the Durbar; but it is desirable that some definite rules should be prescribed by the Government of India for the guidance of both parties, any difference of opinion regarding the application of those rules to individual cases being reserved for the final arbitration of the British Resident in Mysore, who naturally would be the best judge when there is a conflict between the interests of Mysore and British India.

9. Should any definite scheme be put forward by the Madras Government, I beg that I may be afforded an opportunity of submitting my observations thereon, with the object of inviting attention to points affecting the interests of Mysore in a prejudicial manner.

I have the honor to be,
Sir,
Your most obedient servant,
K. SHESHADRI IYER,
Dewan.

Memorandum.

There are two classes of works now being actually carried out or being projected in Mysore, to which objection is taken by the Madras Government, *viz.*,—

(1) Restoration and improvement of old works, and

(2) New works.

In the first class, the most ordinary works involve some increase to the level of the waste-weir of the tanks being dealt with, so as to make up for the loss of capacity due to silting, as also to impound more water in order to meet the increasing irrigational requirements of the country.

In the second class, the works generally are intended to supersede old tanks or anikats more or less in ruin, to supply more permanent irrigation and also to bring additional land under cultivation.

2. In dealing with this question, it is important to bear in mind the greatly undulating character of the country and our precarious rainfall, conditions which make the case of Mysore somewhat different from that of other Provinces.

1st. The cost of storage of water and the risk of accident to the works are much greater than elsewhere, and it is not possible, on financial grounds, to repair at once all our breached tanks and anikats. We have scarcely a square mile of country which is flat. In the more open and level parts, the slope is never less than 10 or 20 feet per mile, while, elsewhere, it is 60 or 80 feet, not to mention the hilly tracts. To control and retain for use the flood water flowing in the valleys is therefore often a matter of exceptional difficulty and expense in Mysore.

2ndly. The process of silting is much more rapid than in most Madras Districts, and periodical raising of the level of our waste-weirs is therefore inevitable.

And *3rdly.* Our tanks are required not only for agriculture, but for the very existence of our population, as without them, the greater part of the Province, especially the north and north-east, would be an uninhabitable waterless tract, for, unless the underground springs are fed by our tanks, it would be impossible in many places to get water even in wells for domestic purposes and for cattle.

3. In the northern parts of Chitaldrug, the rainfall is most scanty and varies between 10 and 20 inches in the year and, on an average we have about one tank for every 3 square miles, and the average cultivation under each tank is about 2½ acres. In the northern taluks of the Kolar District, where some of the works now under dispute are situated, we have about one tank per square mile, and each tank irrigates about 10 acres. These tracts are in a state of chronic suffering from drought, and the best resources of the Government have constantly to be directed towards storing in them as much of our rainfall as possible. Towards this end, we are now merely continuing the policy inaugurated and partly carried out during the British Administration of the Province, and I would beg to invite attention to some of the more important orders of the British Government relating to that policy.

4. In their letter of March 22nd, 1866, Circular No. 25, P. W., the Government of India impressed upon the then Chief Commissioner of Mysore the necessity of executing remunerative irrigation works calculated "to prevent the recurrence or mitigate the severity, of drought or famine."

In his letter No. 3828 of 19th November 1866, Major Sankey, then Chief Engineer, in pursuance of those instructions, reported on the irrigation works of the Province. He stated in para 12 that, out of a total area of 27,269 square miles of Mysore Territory, 16,287 (exclusive of the Western Ghats, where no irrigation is required) have been brought in some remote time under the tank system, and that none of the drainage of these 16,287 square miles should, with proper attention be

allowed to escape, were all existing works in their normal condition. It was, however, found that the tanks generally had greatly deteriorated and that they could not, for that reason, be expected to do the work they were originally capable of doing.

Under such circumstances, Major Sankey proposed an extensive system of tank restoration and enlargement, at an outlay of one million sterling.

Again, on the 22nd June 1872, with Under-Secretary's letter No. 134—1610, I, the Chief Commissioner submitted a Memorandum by the Superintending Engineer, giving full details of the scheme proposed, which aimed at the following main objects:—

1st. To store up in reservoirs, adjacent to the gathering grounds, the portion of the rainfall that may run off the ground, in order that it may be utilized for purposes of irrigation and water-supply, instead of swelling river floods and running away uselessly to the sea.

2ndly. The point on any main drainage below which it is inexpedient to construct a reservoir being determined, to construct at that point a new tank or to improve an old tank if one be existing.

And *3rdly.* To accept, as a first principle, "*if it will pay for storage, it is inadvisable that any water running off should be allowed to escape.*"

On the 20th August 1872, in their letter No. 705 I, the Government of India approved of the scheme described above. Para 4 of that order is important, as it can be inferred from it that the Government of India did not object to the intention of the Mysore Public Works Department, to intercept and retain as much of the rainfall as they possibly could, and the Government of India were only doubtful whether the run-off to be intercepted should not have been assumed at three-fourths of the rainfall as in others parts of India, instead of only at one-fourth, as proposed by the Mysore Public Works Department.

The scheme also received the approval of the Secretary of State in his despatch No. 97 of the 9th October 1872.

5. It was originally intended that the restoration scheme above referred to should be completed before His Hishness the Maharaja attained his majority. Owing to various causes, it was found impossible to execute it completely before the Rendition; it was, however, actually carried out for parts of the Province, and then the famine intervened, and what was left undone for other parts of the Province was left to be done by His Highness the Maharaja, whose Government are now doing their best to complete the scheme thus partly carried out during the British Administration and who may naturally ask that objections on the part of the Madras raiyats, which were never raised before the Rendition, may not now be allowed to be raised against the completion of the scheme inaugurated and partly executed by the British Government.

6. I may perhaps be permitted to add a few remarks on the question of the right to the water in dispute.

(*a*) The supply of water which we purpose to store and use for irrigation and water-supply is only casual, intermittent and exclusively dependent upon the rainfall on Mysore land. We have a *natural* right to collect and dispose of all water on the surface of our land, and though, as between private owners, such *natural* right would (subject to the exceptions hereafter to be noticed) be restricted to water *not* flowing in a defined channel, the case of a State is, I submit, very different. It has to deal with large interests and establish means of irrigation and water-supply over extensive areas, and it cannot effectually dispose of surface water, before it enters some defined channel. And I submit that the question as affecting the State has to be decided on the higher grounds of public welfare and general prosperity and not according to the strict rules of law applicable only to private rights.

(*b*) The State naturally would have greater right of control over water falling on the surface of its own lands and gathering into a defined channel within its own frontier, than it would in the case of a stream rising outside its frontier and merely flowing through it into the Madras Districts; the obligations which may exist in respect of a stream of the latter kind do not arise in any of the cases under dispute. In all

these cases, on the other hand, the works we propose would tend to hold back river-floods running more or less to waste and to establish more perennial streams flowing from Mysore into the Madras Districts.

(*c*) If a right of easement by prescription is claimed on behalf of the Madras raiyats, I can only say (assuming that such a limiting right as an easement can at all be acquired by Madras raiyats against the Mysore State) that it is most difficult to say what period of time would be reasonable for the acquisition of such right against the State. For obvious reasons, the 20 years of the Easement Act would be too short a term, and, in the case of Mysore, the fact of the British Administration of the Province during half a century has an important bearing upon the question.

Moreover, a right of easement can never be acquired by a mere *permissive user*. It cannot be said that Mysore never intended to store its rainfall for irrigation and other purposes to a greater extent than it used to do at some remote period. It is indeed more reasonable to infer that the user in question was *permitted* to be in force only so long as the State did not wish or were not able to store more water. As a matter of fact, the history of the Mysore Irrigation Department, as already shown, bears ample testimony to the Mysore Government having always intended to store and utilize as much of its rainfall as possible, and the presumption of a grant from prescriptive enjoyment is therefore most distinctly and expressly negatived in the case of all Mysore streams, to the extent to which they may be capable of being utilized for irrigation and other purposes within Mysore Territory.

It is also most important to remember that the so-called right by prescription cannot be claimed either in the case of recent Madras works or recent enlargement of old Madras works ; nor, as regards water which now flows to waste over existing Madras works, can any right whatsoever be claimed by Madras, for, the essence of a prescriptive right is enjoyment and use, which cannot of course be predicated of what is allowed to run to waste.

And lastly, it is worthy of note that we have always impounded—in increasing quantities as our works increased—as much of our rainfall as possible. This increasing appropriation has, until recently, never been objected to by Madras. This is not surprising if we remember that (as pointed out by Colonel Sankey in his letter of 19th November 1866) the old Mysore tank system was so perfect that, were all tanks in their normal condition, none of the drainage of 16,287 square miles commanded by the system could possibly escape, and that, therefore, the so-called new works and new or increased storage of water were, in reality, new methods of securing what the old system secured in a different way.

And (*d*) Even in the case of private riparian owners, they have the natural right to use the water flowing through their land in a defined channel for all reasonable purposes, including the irrigation of land, *provided they do not thereby destroy or materially diminish or affect the application of the water by riparian owners below the stream*, either in exercise of their natural right or right of easement. (See *Embrey* v. *Owen*, 6, Exch., 372 and XI Indian Law Reports, Madras 19.) Assuming, for the sake of argument, that this well-recognized principle of Municipal Law is applicable to the case of two neighbouring Provinces, I am sanguine that it would be found, upon investigation, that Mysore is strictly within its right in carrying out the works to which objection has been taken by the Madras Government.

7. Taking, for instance, the case of the Chitravati Tank, about which we have already collected full information, *no reasonable* objection can be urged against its construction. The raiyats of Bukkapatam in Madras complain on the ground of an apprehended diminution of supply to their tank. Their complaint is obviously groundless for the following principal reasons :—

1st. The area of Mysore country drained by the Chitravati and its tributary, Kushavati, is about 581 square miles (Chitravati 476 and Kushavati 105). Of this large area, the new Mysore tank will but partially intercept the drainage of 48 square miles. Assuming the run-off at only one-fourth of the rainfall (though we may not unreasonably assume half for so steep a part of the country), we still leave a large quantity of water unintercepted by the new tank, about a * third of what runs off the gathering ground of 48 square miles and is not already intercepted by existing tanks. In the calculations in the margin, I take no account of the Valasanhalli Ryankere (with a catchment area of 15·04 square miles) for which we have recently substituted an anikat, thus releasing for storage in the new tank what formerly was storable in Valsanhalli.

*Rainfall	24 inches.		
Run-off at about 6 in. on 48 square miles			Units. =2,560
Already intercepted by—			
(1) Four large tanks	... 526		
(2) Minor works (assumed)	... 274		
			1800
Remaining		...	1,760
To be stored in new tank		..	1,200
Remaining		...	560

† The storage capacity of existing tanks above was (in letter to Assistant Resident, dated 25th December 1889) roughly assumed at 1,000 units. The Executive Engineer assumed it at 800 units at a rough guess giving details for only 526.
Unit = 10,000 cubic yards.

2ndly. Again, from the site of the new tank, the length of the course of the Chitravati in Mysore Territory is 18 miles, and from the frontier to the Bukkapatam tank is 32 miles. Total length from the new tank to Bukkapatam tank is thus about 50 miles, and in a straight line the distance between the two tanks is 40 miles. It is, I think, unreasonable to contend that the supply to Bukkapatam tank can be sensibly affected by a new work situated at such great distance from it.

3rdly. Moreover, at the site of the new Mysore tank, the Chitravati is an insignificant stream, dry throughout the greater part of the year. The new tank is so near its source that the volume of the stream which it intercepts is but a very small fraction of its volume when it leaves Mysore.

4thly. The Bukkapatam tank not only receives this large stream and its tributary (draining 581 square miles of Mysore Territory), but it also receives the drainage of a large tract of British Territory, some 850 square miles roughly calculated from the Atlas sheet. This tract is full of tanks which, I understand, have been enlarged to a greater or less extent from time to time, thus presumably diminishing the supply to the Bukkapatam tank. No information is furnished as regards the magnitude or age of such enlargements, and it is therefore impossible to say to what extent the claim of the Bukkapatam raiyats is professed to be supported by actual enjoyment during a lengthened period. Indeed, the Bukkapatam raiyats have done little more than take an objection to the proposed Mysore work upon the general ground of an apprehended diminution of supply to their own tank, as raiyats everywhere are only too prone to do. No grounds whatever for any such apprehension are yet shown to exist, though the burden of proving a material and injurious diminution is upon the Bukkapatam raiyats who seek to limit a natural right vested in Mysore. On the other hand, the facts I have briefly stated above go to show that no reasonable grounds exist for apprehending any injurious diminution of supply of water to the Bukkapatam tank. But, apart from the question of diminution or no diminution, the Mysore work proposes to do no more than make a reasonable use of the rainfall gathering on Mysore land and this by itself is, I submit, a sufficient answer to the objection raised by the Madras Government.

And *5thly.* It is shown that, below the new Mysore tank, there are no less than 15 anikats in various degrees of disrepair. If we maintain them in that state of repair and progressive improvement (our right to do which cannot, I think, be denied), we would, in that way, intercept more of the Chitravati waters than the new tank is calculated to do. The new tank also supersedes some old ones which actually existed but it is naturally on a much larger scale on economic grounds.

8. Setting aside, however, the purely legal aspect of the case which has been briefly discussed in the preceding paragraphs and which is obviously incapable of satisfactory application to the relations existing between the Mysore State under the protection of the British Government on the one side and the Madras Districts directly administered by the Paramount Power on the other, it is mainly, I contend, on the higher ground of the interest of the people that a favourable view should be taken of the efforts of the Durbar to utilize to the utmost the rain-water falling on the surface of the country. To what extent such efforts should be limited would seem to be a question beyond the domain of ordinary law and one specially for the consideration and decision of the Government of India. That Government, owing to its administration of Mysore during 50 years including several periods of drought and famine, is intimately acquainted with our large and important requirements for storage of water, with our special system of tanks and with the past history and present development of our irrigation policy. The claim of Madras is very general and far-reaching in its character, and embraces all Mysore works, large and small, the nearest as well as the most remote. We have not as yet been furnished with any definite statement of the claim thus made, though, at the Conference recently held at Ootacamund, the general proposition was put forward that, as a matter of right, Mysore could not intercept any portion of the water, which, during the past 20 years, has been allowed to run down into Madras Districts, and that, therefore, every irrigation work in Mysore required the previous consent of the Madras Government, who, however, were prepared to waive their objection as regards petty works calculated to irrigate 100 or 200 acres. I have already endeavoured to show that Mysore possesses very extensive rights in the respect of the water under dispute, and I may here add that such rights could not be extinguished by mere lapse of time however long. It may be that, owing to causes beyond control, the Mysore Government have not hitherto been able to exercise their rights to the fullest possible extent and have allowed their tanks and other works to fall into disrepair, while the Madras Government went on improving their resources and enlarging their irrigation. But this, I submit, cannot have the effect of destroying the natural rights of the State to a beneficial enjoyment of its waters. It is also important to remember that it has not yet been shown that any of our proposed works is likely materially to diminish the water-supply to the Madras Presidency. Not only would any such diminution be most unlikely, but there would still be left a large volume of water to be annually carried uselessly to the sea by the Mysore rivers, and Madras can help its raiyats more by utilizing these waters, than by endeavouring to stop the works undertaken by the Mysore Government. If, indeed, no works calculated to intercept any portion of the waters of the Mysore rivers is hereafter to be undertaken by Mysore without the consent of Madras, it is only fair that the obligation should be reciprocal. At any rate, Mysore should have due notice from time to time of the creation of new works and enlargement of old works in Madras, in respect of which a right by way of prescription would be claimed at some future time. And I will only add that if every Mysore work of any consequence is to be objected to by Madras, the investigation necessary for the final settlement of each case would be unduly prolonged and involve an examination of the irrigation history of large drainage areas in Mysore as well as in Madras, during a long series of years. Under such circumstances, unless some general rules defining exactly the rights of Mysore in regard of the perservation and extension of its irrigation system are laid down by the Government of India, I apprehend the most serious interruption to the progress of all irrigation works in Mysore. The Durbar are most anxious to adopt some plan which, while it leaves them unhampered to complete their own irrigation system at an early date, would, at the same time, afford protection to the real interests of the raiyats in the neighbouring districts of Madras. A scheme somewhat on the following lines would, in my opinion, effectually protect all interests:—

A. Streams supplied exclusively by the Drainage of Mysore Territory.

1. Any old tank, anikat or channel, within a distance of 5 miles from the frontier can be repaired or restored, provided such repair or restoration does not irrigate more land than can be shown to have been formerly irrigated. The distance to be measured from the tank waste-weir to the frontier down the natural drainage of the tank or other work. Within the distance of 5 miles measured as above, no new works to be undertaken.

2. The same rule to hold good as regards old tanks, anikats or channels within a distance (measured as above) of ten miles from the frontier, but it will be permissible to substitute new works on engineering and economical grounds for such old ones, provided the total areas to be so irrigated will not exceed the formerly irrigated areas to a greater extent than 25 per cent.

3. Beyond the distance of 10 miles and within a distance of 40 miles from the frontier (measured as above), Mysore to be at liberty to restore all old works or construct new ones, so as to utilize not more than one-fourth of the average rainfall as calculated from the surfaces drained and the available recorded rainfall observations.

4. When, as is sometimes the case, a drainage traverses Madras or Bombay Territory before entering Mysore, the one-fourth of the rainfall to be intercepted to be calculated only over the drainage area appertaining to Mysore. The same rule to hold good in regard of irrigation operations undertaken by Madras or Bombay across drainages partially affecting Mysore.

5. Beyond the distance of 40 miles from the frontier (measured as above), Mysore operations to be absolutely unrestricted.

B. Streams which rise outside the Frontier of Mysore and flow through Mysore Territory into British Territory.

6. Within a distance of 40 miles from the frontier (measured as above), Mysore to be at liberty to construct new works or repair old works, so long as there is no material diminution of the volume of water passing into British Territory during the dry months from December to April.

7. Beyond a distance of 40 miles from the frontier (measured as above), Mysore operations to be absolutely unrestricted.

C. General.

8. Where the main stream of a drainage is coincident with the frontier, the distance of a work in its valley from the frontier to be computed from the point at which the channel leaves or separates from the frontier line.

9. Should there arise any difference of opinion between the Madras and Mysore authorities, in the application of the above rules to any individual case, such difference to be submitted to the arbitration of two officers, one to be deputed by each Government, with the British Resident as Umpire.

GUINDY,
10th June 1890.

K. SHESHADRI IYER,
Dewan of Mysore.

APPENDIX B.

Rules for the Regulation of Water at Upper Anikat.

(i) Rules for the Guidance of the Superintendent, Upper Coleroon Anikat.

I. Except after periods of scarcity, the sluices of North and South Branches will be opened when water rises to 6·5 feet on the Cauvery Dam gauge.

II. The sluices of the South Branch will be closed when water falls to 6·0 feet on the Cauvery Dam gauge and those of the North Branch when water falls to crest level.

III. After a period of scarcity, that is, when during the previous week the water level has not exceeded 6·0 feet at the Cauvery Dam, the sluices of both branches will not be opened until water rises to 7·0 feet on the Cauvery Dam gauge.

IV. In opening the sluices, the Superintendent should begin with the middle ones, and in closing, with the end ones.

In the South Branch, numbering the sluices from the south end, the following will be the order for opening them: 4, 3, 5, 2, 6, 1, 7; and for closing, the reverse order: 7, 1, 6, 2, 5, 3, 4. Numbering similarly the vents in the North Branch, they will be opened in the order 4, 5, 3, 6, 2, 7, 1, 8; and closed in the order 8, 1, 7, 2, 6, 3, 5, 4.

NOTE.—The Cauvery Dam gauge to which levels are referred is the enamelled iron gauge at the north end of dam.

J. BEATTY, COL. R.E.,

27th July 1882. *Superintending Engineer, VI Circle.*

Approved by the Chief Engineer for Irrigation in Memorandum No. VI—2-T. J., dated 19th February 1882.

APPENDIX C.

Rules for Regulation at Cauvery-Vennar Regulators.

A full and ample supply to the Delta is considered to be passing when there is a discharge of 11,240 c.ft. per second into the Cauvery and 6,104 c.ft. per second into the Vennar.

2. When there are no local floods in the Delta, the Vennar regulator is to be kept open as long as water does not rise to above 7 feet on the front gauge and shutters of the Cauvery regulator adjusted so as to give proportionate discharges into the two rivers, according to the following table:—

Depth above Regulator	Cauvery		Vennar	
	C. yds. per acre per hour	Total discharge c. ft. per second	C. yds. per acre per hour	Total discharge c.ft. per second
6	4	15,000	2⅔	8,140
5	3	11,240	2	6,104
	2½	9,370	1⅔	5,080
4	2	7,492	1⅓	4,070
4	1½	5,620	1	3,050
3	1	3,746	⅔	2,030
2	½	1,873	⅓	1,015

NOTE.—Intermediate readings to be interpolated.

3. When water reaching the regulator is more than will give the discharges stated in rule 2, water will be admitted to Cauvery up to 7 feet on the rear gauge.

4. If water still continues to rise, it will be passed into the Vennar until the rear gauge reads 8 feet unless the Superintendent has received information that the Vennar is in danger from local drainage, in which case the water should be reduced to 6·5 feet. On orders from the Executive Engineer, the Vennar regulator may be closed entirely.

5. If water in front of the regulator rises above the level required to give gauge depths stated in rules 3 and 4, 7½ feet may be admitted to the Cauvery, and if the rise continues, the shutters of the Cauvery regulator must be raised so that the difference in level in front and rear shall not exceed 4½ feet.

The above rules were formulated on 27th April 1888 and sent by the Superintending Engineer to the Executive Engineer for introduction with letter No. 750 T. J., dated 2nd July 1888.

These rules remained in force till 1894 when the old Vennar head was closed and revised rules approved by the Chief Engineer for Irrigation in V. 80 T. J. of 28th August 1894, were introduced. They are as below:—

Cauvery-Vennar Regulators.

RULES REVISED.

1. If the water rises above 7 feet on the front gauge, open Cauvery shutters till the rear gauge of Cauvery reads 6·2. Cauvery and Vennar shutters will now be fully open.

2. If water still rises, keep on opening both regulators exceeding with no exception 9 feet on Vennar rear gauge or 6·5 feet on the Pillai Voikal gauge and as a rule 7·5 on the Cauvery rear gauge.

3. But if the rise still continues, let water down the Cauvery shutters taking care that the difference in front and rear levels of water does not exceed 4½ feet.

4. If you see heavy rain in the south-east of grand Anikat, reduce rear gauge of Vennar to 6·5. Reduce still further if you receive reports that the Vennar is in danger from local drainage.

5. If the cross bank at the Vennar old head breaches, act according to former printed rules.

APPENDIX D.

Table of discharges in *m. c. ft.* in the month of June for the years 1890 to 1909.

Years	First half of June					Second half of June					Remarks
	Discharge at the Cauvery Dam	Discharge into the Coleroon over the Upper Anikat	Grand Anikat discharge	Combined discharges of the Cauvery and the Vennar	Discharge at Lower Anikat	Discharge at the Cauvery Dam	Discharge into the Coleroon over the Upper Anikat	Grand Anikat discharge	Combined discharges of the Cauvery and the Vennar	Discharge at Lower Anikat	
1	2	3	4	5	6	7	8	9	10	11	12
1890 ...	5,224	...	...	2,257	*2,915*	9,133	...	...	7,948	*779*	
1891 ...	6,345	...	...	3,520	*669*	6,130	...	...	3,246	*472*	
1892 ...	8 032	...	...	4,048	*2,055*	11,258	308	35	6,826	*506*	
1893 ...	13,541	362	4	11,233	*1,720*	30,406	9,342	693	24,807	*12,488*	(i) During the first half of June, in fifteen years out of twenty, discharges at the Lower Anikat are far in excess of the surplusses at the Upper and Grand Anikats.
1894 ...	6,807	...	...	...	...	18,081	2,020	...	...	*965*	
1895 ...	3,306	...	...	175	*12*	28,372	18,316	8,689	19,364	20,468	
1896 ...	4,250	..	...	822	*227*	40,094	41,154	19,378	24,799	32,549	
1897 ...	5,662	...	...	2,220	*1,148*	35,457	27,851	8,435	26,799	33,495	
1898 ...	4,030	...	...	...	*146*	24,402	6,080	...	...	8,646	
1899 ...	4,096	...	1,572	129	*4,173*	24,183	11,880	3,374	15,828	14,305	
1900 ...	3,979	...	...	1,694	20	20,903	6,200	96	31,443	1,438	(ii) During the second half of June, in nine years out of twenty, the discharges at the Lower Anikat are similarly higher than the surplusses at the two higher anikats.
1901 ...	4,910	...	...	3,272	...	20,753	4,791	...	22,652	2,335	
1902 ...	3,568	...	1,727	288	*808*	8,452	92	...	7,174	184	
1903 ...	5,786	...	...	3,441	*1,984*	9,558	...	...	8,151	*3,411*	
1904 ...	15,207	...	3,702	7,138	*9,581*	31,637	27,211	11,403	19,855	*42,895*	
1905 ...	4,335	...	...	2,292	*4,630*	8,246	...	...	7,559	*1,091*	
1906 ...	692	...	...	343	...	4,076	656	...	2,818	...	
1907 ...	5,066	...	2,594	1,138	...	14,807	...	1,515	10,410	...	
1908 ...	2,382	..	...	2,817	*2,787*	5,270	...	...	6,704	*1,611*	
1909 ...	21,577	20,722	6,659	16,803	4,759	15,447	8,897	2,852	15,974	3,363	

APPENDIX E.

Provisional Rules for Working the Mysore Reservoir.

N. B.—For ready reference to the working tables, No. III of Appendix P, the corresponding columns thereof have been noted under the several clauses of these rules.

1. The total flow in the river, up to the limits mentioned in the following table (Col. 16) shall be considered as the supply at the Cauvery Dam across the Akhanda Cauvery to which Madras is entitled during the irrigation season from 1st June to 31st January by prescriptive right according to Rule III of the Agreement of 1892.—

		Proposed depths in feet	Daily Discharge m. c.ft.
June ...	1st half ...	3·5	450
	2nd „ ...	5·1	1,060
July ...	1st „ ...	6	1,625
	2nd „ ...	6	1,625
August ...	1st „ ...	6	1,625
	2nd „ ...	6	1,625
September ...	1st „ ...	6	1,625
	2nd „ ...	5·2	1,120
October ...	1st „ ...	5·4	1,240
	2nd „ ...	5·4	1,240
November ...	1st „ ...	5·0	1,000
	2nd „ ...	4·4	696
December ...	1st „ ...	3·9	538
	2nd „ ...	3·0	370
January ...	1st „ ...	2·5	290

2. Any flow in the river at the Upper Anikat in excess of the above limits shall be considered as available for storage in Mysore, that is, in the Kannambadi Reservoir, with due increase for losses in transmission.

The transmission factor is taken as three-fourths between Kannambadi and the Cauvery Dam, *i.e.*, a flow of 100 at the Kannambadi Reservoir would be $\frac{3}{4} \times 100 = 75$ at the Cauvery Dam and a flow of 75 at the Cauvery Dam would be $75\frac{3}{4} = 75 \times \frac{4}{3} = 100$ at the Kannambadi Reservoir. *Vide* Cols. 2c & 2d; 2e & 4; 4 & 6.

3. From 1st February to 31st May, the entire flow in the river shall be available for impounding within Mysore limits.

4. The officer at Kannambadi shall compute the quantity to be impounded in any day in the reservoir in the following manner:—

(*a*) First, he will ascertain the exact flow into the Kannambadi Reservoir. (Col. 2a.)

(*b*) The approximate flow at Cauvery Dam corresponding to the flow at Kannambadi on any day shall be taken as $\frac{8}{5}$ or 1·6 times the Kannambadi flow during the months of June to September and three times the Kannambadi flow during the months of October to January. (Col. 2b.)

(*c*) The excess of the flow at the Cauvery Dam over the limit of flow fixed in Rule 1 (Col. 16) above, would be available for impounding; and this converted into its equivalent at Kannambadi as provided under Rule 2, shall be taken as the quantity permissible for impounding on that day. (Col. 2d.)

(*d*) This quantity or the flow at Kannambadi if less, will be stored in the reservoir. (Col. 2e.)

5. (*a*) The total river discharge (Col. 3) at the Cauvery Dam on any day in the irrigation season 1st June to 31st January, shall be taken as the sum of

(i) the actual flow at the Cauvery Dam on that day (Col. 7),

(ii) equivalent at the Cauvery Dam of the quantity of water impounded at the Kannambadi Reservoir three days previously (Col. 4),

(iii) less compensation water, if any, being the equivalent of the water passed down from the Kannambadi Reservoir 3 days previously, for necessary adjustment of excess storage as provided in Rule 6 below (Col. 6).

Thus Col. 3 = Col. 7 × Col. 4—Col. 6, 3 days previous.

6. The quantity of compensation water due to Madras shall be computed thus:—

(*a*) The actual flow at Cauvery Dam (Col. 7) less the quantity of compensation water (Col. 6) if any, received on that day, shall be considered as the net flow, (Col. 5), at Cauvery Dam.

(*b*) If the total discharge arrived at under Rule 5 (Col. 3), be higher than the limit fixed in Rule 1 (Col. 16), the excess of the limit flow over the net flow determined under Rule 6 (*a*), shall be the compensation water due to Madras from the Kannambadi Reservoir. (Col. 16—Col. 5.)

(*c*) If, on the other hand, the said total discharge (Col. 3), be less than the limit (Col. 16) the excess of this discharge over the said net flow shall be the compensation water due to Madras from the Kannambadi Reservoir. (Col. 3—Col. 5.)

7. The gauges at the Cauvery Dam and the reservoir shall ordinarily be read at least twice a day at 6 A.M. and 6 P.M., but during floods they shall be read every hour or at other intervals as may be required by Mysore, and the information communicated by telegram. The average daily discharge shall be calculated from such readings so as to give the closest approximation to actual discharge.

8. Gauges shall also be established at the stations named below:—

Within Mysore Territory.

(*a*) Hulhalli Anikat across the Kapini.
(*b*) Kalhalli Anikat across the Hemavati.
(*c*) Chamaraj Anikat across the Cauvery.
(*d*) Ayerhalli Anikat on the Lakshmanthirtha.
(*e*) Meke Datu on the Cauvery below the junction of the Arkavati.

Within Madras Territory.

(*f*) A station on the Cauvery below the junction of the Bhavani.
(*g*) A station at a point below the junction of the Noyel and the Amaravati.

9. The gauge readings at the stations mentioned in Rule 8 shall be telegraphed to the officer at Kannambadi daily at suitable intervals.

10. The charges incurred in this connection by the Madras Government shall be borne by the Mysore Durbar.

11 Copies of the above gauge-readings shall be supplied to the officer at the Cauvery Dam.

12. The Officer in charge of the Cauvery Dam shall have instructions to telegraph to the officer in charge of the Kannambadi Reservoir, whenever, on account of rain in the delta or other reason, the entire flow in the river may be impounded in the reservoir.

13. The following items shall be considered as tentative, subject to due alteration after a period of test extending to 6 years:—

(1) The percentage of losses in transmission noted in Rule 2.
(2) The time of transmission noted in Rule 4.
(3) The ratios of the Cauvery Dam flow to that at Kannambadi noted in Rule 5 during the south-west and north-east monsoon periods respectively.

XIV

APPENDIX E—*concld.*

Table showing how the limits in the rules have been fixed.

Periods	Projects limits		25 per cent above projects limits		Depths corresponding to average fortnightly discharge	Limits proposed in rules, Col. 5 or Col. 6 whichever is greater, subject to 6 feet limit
	Discharge	Depths	Discharge	Corresponding depths		
1	2	3	4	5	6	7
June ... 1st half ...	356	2·9	445	3·5	13·5	3·5
June ... 2nd „ ...			...	...	5·1	5·1
September ... 2nd „ ...	815	4·7	1,060	5·1	5·2	5·2
October ... 1st „ ...	1,009	5·0	1,261	5·4	5·4	5·4
October ... 2nd „ ...	635	4·2	794	4·6	5·4	5·4
November ... 1st „ ...	508	3·8	635	4·2	5·0	5·0
November ... 2nd „ ...			...	...	4·4	4·4
December ... 1st „ ...	371	3·0	464	3·6	3·9	3·9
December ... 2nd „ ...	150	1·7	188	1·9	3·0	3·0
January ... 1st „ ...	216	2·1	270	2·4	2·5	2·5
January ... 2nd „ ...						

N.B.—The full limit of 6 feet is allowed for the five fortnights, July, August, and first half of September.

APPENDIX F.

Statement showing areas irrigated as compared with supplies, (*a*) due to 7 feet limit discharges, (*b*) supplies actually used, and (*c*) supplies that would be available with the limits proposed by Mysore, for the twenty years ending 1909-10.

Year	Delta area	Supply due to 7 feet limit	Actual supply at head works	Supply as per limits in rules	Remarks
1	2	3	4	5	6
1890-91	1,013,344	204,209	129,078	163,431	
1891-92	1,008,059	234,892	128,398	175,896	
1892-93	1,012,049	246,637	143,184	204,940	
1893-94	996,055	309,513	179,123	225,374	
1894-95	989,891	207,779	125,501	184,354	
1895-96	987,103	273,365	164,005	210,742	
1896-97	977,123	310,678	227,560	225,999	
1897-98	989,808	299,394	205,990	220,527	
1898-99	994,118	315,730	173,508	210,491	
1899-00	954,123	157,199	117,312	132,123	
1900-01	993,588	270,580	229,671	210,753	
1901-02	994,220	303,263	204,624	219,432	
1902-03	941,261	263,964	173,109	191,965	
1903-04	929,819	349,395	223,146	224,944	
1904-05	945,748	216,300	128,933	162,033	
1905-06	993,616	176,636	165,265	158,659	
1906-07	983,106	223,131	185,701	183,140	
1907-08	994,209	241,750	236,777	197,405	
1908-09	996,950	194,762	177,068	163,995	
1909-10	1,003,649	272,464	252,337	221,747	

APPENDIX G.

Tables showing quantities of flow that would have been available for Madras irrigation with the limits proposed by Mysore as compared with the quantities due to a uniform limit of 6 feet for the twenty years ending 1909-10.

Months	1890-1891		1891-1892		1892-1893		1893-1894		Remarks
	Net quantity realised up to the limits proposed in the rules	Net quantity realized up to the uniform limit of 1625	Net quantity realized up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realized up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	
June ... 1st half ...	5,048	5,224	5,392	6,345	6,286	8,032	6,654	12,835	
June ... 2nd „ ...	9,077	9,113	6,130	6,130	10,269	11,201	13,780	22,930	
July ... 1st „ ...	12,524	12,524	16,985	16,985	16,451	16,451	21,197	21,197	
July ... 2nd „ ...	21,733	21,733	22,807	22,807	26,000	26,000	22,258	22,258	
August ... 1st „ ...	24,126	24,126	24,375	24,375	24,375	24,375	24,013	24,013	
August ... 2nd „ ...	21,727	21,727	22,872	22,872	26,000	26,000	17,807	17,847	
September ... 1st „ ...	12,358	12,358	18,135	18,135	24,375	24,375	23,023	23,023	
September ... 2nd „ ...	7,572	7,572	8,800	8,800	15,630	16,819	13,536	13,936	
October ... 1st „ ...	12,654	12,795	15,700	16,845	16,350	16,530	17,970	22,002	
October ... 2nd „ ...	10,140	11,295	19,840	25,031	18,148	21,206	19,840	25,864	
November ... 1st „ ...	15,000	23,853	14,244	17,257	8,398	8,398	13,142	16,691	
November ... 2nd „ ...	8,010	9,283	7,658	7,746	4,702	4,702	10,440	24,307	
December ... 1st „ ...	5,740	5,740	3,804	3,804	2,718	2,718	8,048	12,027	
December ... 2nd „ ...	4,530	4,546	5,546	6,254	2,850	2,850	5,824	6,478	
January ... 1st „ ...	1,192	1,192	3,756	3,900	1,614	1,614	4,350	4,878	
January ... 2nd „ ...	...	...	1,754	1,754	774	774	3,492	3,508	
Total ...	163,431	175,108	175,896	184,037	204,940	212,045	225,374	273,784	
Total actual supply to delta area	129,078		128,398		143,184		179,123		
Total actual supply including supply to Coleroon ...	143,420		142,659		159,093		199,025		

XVI

APPENDIX G—*contd.*

Months	1894-1895		1895-1896		1896-1897		1897-1898		Remarks
	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realized up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realized up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	
June ... 1st half ...	6,446	6,807	3,304	3,304	4,250	4,250	5,640	5,662	
2nd „ ...	30,946	17,405	11,520	17,170	13,259	17,344	13,760	19,833	
July ... 1st „ ...	8,869	8,869	22,872	22,872	24,019	24,019	15,801	15,801	
2nd „ ...	24,225	24,225	25,569	25,569	26,000	26,000	25,819	25,819	
August ... 1st „ ...	21,647	21,647	24,375	24,375	24,375	24,375	24,375	24,375	
2nd „ ...	26,000	26,000	25,568	25,568	26,000	26,000	26,000	26,000	
September ... 1st „ ...	16,644	16,644	12,504	12,504	23,318	23,318	24,337	24,337	
2nd „ ...	11,754	11,814	11,356	12,871	15,956	17,665	16,641	22,055	
October ... 1st „ ...	6,050	6,050	18,174	22,086	18,120	21,404	18,600	24,214	
2nd „ ...	17,369	21,001	19,720	22,868	11,568	11,568	17,006	19,693	
November ... 1st „ ...	13,710	17,371	14,338	20,948	6,324	6,324	11,472	11,712	
2nd „ ...	7,198	7,198	7,148	7,148	10,066	17,639	6,474	6,474	
December ... 1st „ ...	6,254	6,276	5,486	5,486	8,070	15,691	5,724	5,724	
2nd „ ...	3,636	3,636	4,476	5,731	6,016	14,281	3,972	3,972	
January ... 1st „ ...	606	606	4,332	8,250	4,350	5,690	2,700	2,700	
2nd „ ...	...	...	...	...	4,298	4,394	2,206	2,206	
Total ...	184,354	195,549	210,742	236,750	225,999	259,962	220,527	260,577	
Total actual supply to delta area	**125,501**		**164,005**		**227,560**		**205,990**		
Total actual supply including supply to Coleroon ...	**139,445**		**182,238**		**252,845**		**228,878**		

APPENDIX G—*contd.*

Months	1898-1899		1899-1900		1900-1901		1901-1902		Remarks
	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	
June ... 1st half ...	4,030	4,030	4,696	4,696	3,979	3,979	4,888	4,910	
2nd „ ...	14,552	20,147	13,093	17,168	12,670	16,823	13,550	17,676	
July ... 1st „ ...	14,154	14,154	22,179	22,179	24,375	24,375	18,454	18,454	
2nd „ ...	17,106	17,106	15,648	15,648	26,000	26,000	25,948	25,948	
August ... 1st „ ...	24,194	24,194	6,889	6,889	24,375	24,375	24,375	24,375	
2nd „ ...	15,876	15,876	10,538	10,538	25,962	25,962	24,510	24,510	
September ... 1st „ ...	17,977	17,977	16,277	16,277	23,338	23,338	13,292	13,292	
2nd „ ...	16,800	24,375	15,054	18,641	15,036	17,560	16,104	19,874	
October ... 1st „ ...	18,600	18,600	7,340	7,340	12,894	14,366	18,600	23,787	
2nd „ ...	19,442	23,983	10,321	10,321	15,842	17,887	16,353	19,048	
November ... 1st „ ...	15,000	24,176	5,830	5,830	7,954	7,954	14,838	21,038	
2nd „ ...	10,440	21,251	1,504	1,504	5,452	5,452	10,338	17,408	
December ... 1st „ ...	8,070	16,561	938	938	3,244	3,244	7,520	8,679	
2nd „ ...	5,550	10,667	482	482	4,116	4,116	5,744	6,064	
January ... 1st „ ...	4,350	9,065	782	782	2,718	2,990	4,350	6,832	
2nd „ ...	4,350	5,504	552	552	2,798	2,846	4,568	5,000	
Total ...	210,491	274,879	132,123	139,785	210,753	221,267	219,432	236,895	
Total actual supply to delta area	**173,508**		**117,312**		**229,671**		**204,624**		
Total actual supply including supply to Coleroon ...	**192,775**		**129,043**		**255,190**		**227,360**		

APPENDIX G—*contd.*

Months	1902-1903		1903-1904		1904-1905		1905-1906		Remarks
	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	
June ... 1st half ...	3,568	3,568	5,478	5,786	6,750	15,035	4,336	4,336	
2nd „ ...	7,706	8,544	9,392	9,558	15,900	24,082	7,261	8,246	
July ... 1st „ ...	10,425	10,425	7,161	7,161	24,375	24,375	21,784	21,784	
2nd „ ...	26,000	26,000	26,000	26,000	26,000	26,000	19,539	19,539	
August ... 1st „ ...	19,928	19,928	24,375	24,375	23,081	29,533	18,318	18,318	
2nd „ ...	10,876	10,876	26,000	26,000	19,181	19,181	14,509	14,509	
September ... 1st „ ...	20,784	20,784	24,142	24,142	5,940	5,940	19,779	19,779	
2nd „ ...	15,984	20,014	16,800	24,115	13,065	14,741	9,930	10,600	
October ... 1st „ ...	12,326	14,251	18,600	23,855	6,674	6,674	11,193	13,118	
2nd „ ...	17,390	20,980	19,840	25,675	13,505	14,089	14,574	17,269	
November ... 1st „ ...	14,526	20,894	15,000	21,694	5,002	5,002	4,338	4,338	
2nd „ ...	9,472	13,987	10,440	24,074	1,424	1,424	5,142	5,142	
December ... 1st „ ...	8,070	19,984	8,070	22,975	322	322	4,376	4,376	
2nd „ ...	5,920	17,395	5,920	11,492	282	282	1,974	1,974	
January ... 1st „ ...	4,350	6,550	4,350	10,308	240	240	230	230	
2nd „ ...	4,640	5,536	3,376	3,808	292	292	1,376	1,376	
Total ...	191,965	239,716	224,944	291,018	162,033	180,760	158,659	164,934	
Total actual supply to delta area	**173,109**		**223,146**		**128,933**		**165,265**		
Total actual supply including supply to Coleroon ...	**192,343**		**247,940**		**143,248**		**183,628**		

APPENDIX G—*concld.*

Month		1906-1907		1907-1908		1908-1909		1909-1910		Remarks
		Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	Net quantity realised up to the limits proposed in the rules	Net quantity realised up to the uniform limit of 1625	
June ...	1st half ...	692	692	5,066	5,066	2,382	2,382	6,382	16,629	
	2nd ...	4,479	4,733	11,477	13,976	5,270	5,270	14,008	18,149	
July ...	1st ...	5,479	5,479	18,194	18,194	18,515	18,515	24,375	24,375	
	2nd ...	19,988	19,988	16,784	16,784	25,430	25,430	26,000	26,000	
August ...	1st ...	24,062	24,062	24,375	24,375	24,375	24,375	24,375	24,375	
	2nd ...	26,000	26,000	26,000	26,000	24,139	24,139	24,778	24,778	
September ...	1st ...	22,757	22,757	22,756	22,756	17,552	17,522	24,375	24,375	
	2nd ...	15,300	16,737	11,909	13,349	5,964	5,964	16,800	23,958	
October ...	1st ...	14,004	17,015	14,584	17,279	6,374	6,374	18,600	23,958	
	2nd ...	16,338	20,188	11,046	12,124	11,969	11,969	17,578	21,553	
November ...	1st ...	7,493	7,493	9,484	11,680	9,461	11,659	11,666	14,451	
	2nd ...	7,286	9,340	8,330	9,133	2,546	2,546	4,698	4,698	
December ...	1st ...	6,042	6,098	5,070	5,070	1,334	1,334	3,882	3,882	
	2nd ...	5,632	8,190	5,696	5,856	1,696	1,696	3,270	3,270	
January ...	1st ...	4,350	5,216	3,300	3,332	4,218	12,235	700	700	
	2nd ...	3,238	3,238	3,334	3,462	2,770	2,802	260	260	
	Total ...	183,140	197,226	197,405	208,436	163,995	174,212	221,747	255,348	
Total actual supply to delta area		**185,701**		**236,777**		**177,068**		**252,337**		
Total actual supply including supply to Coleroon.		**206,334**		**263,086**		**195,632**		**280,373**		

APPENDIX H.

Tentative rules for making allowance for rainfall.

1. Daily telegrams should be sent to the officer at Kannambadi between the months of June to January from each of the rain gauge stations in the delta area including the Coleroon system at about 8 A. M. every day.

2. If the rain gauge stations are not telegraph stations, the gaugings may be telephoned to the nearest telegraph station for transmission to the officer at Kannambadi.

3. Allowance shall be made only for falls of 1¼" and over.

4. The proportion of reduction in the limits due at the Cauvery Dam corresponding to the intensity and distribution of rainfall will be as under :—

Rainfall	Rainfall over whole area		Rainfall over three-fourths area		Rainfall over one-half area		Remarks
	Number of days to which the reduced limit applies	Proportion of reduction in limit	Number of days to which the reduced limit applies	Proportion of reduction in limit	Number of days to which the reduced limit applies	Proportion of reduction in limit	
Inches				Per cent		Per cent	
1¼	1	Full	...	...	...	...	
1½	2	Do	1	75	...	...	
1¾	3	Do	2	75	1	50	
2	4	Do	3	75	2	50	
2¼	5	Do	4	75	3	50	
2½	6	Do	5	75	4	50	

5. Any costs incurred in this connection shall be borne by the Mysore Government.

APPENDIX K.

Statement of discharges in the Coleroon showing the quantities used for irrigation of the Lower Anicut system.

1899-1900.

Month	Fortnights	Upper anicut into Coleroon	Grand anicut into Coleroon	Discharge over the 150 yards Kalingula	Total of columns 3, 4 and 5	Total observed discharge at lower anicut	Quantity due to leakage, etc.	Lower anicut into Coleroon	Net quantity used for Irrigation (col. 7 = col. 9)	Quantity passed through Vadavar	Quantity required for direct Irrigation 20 m. c. ft. per day	Net flow to Veeranam tank (col. 11 = col. 12)	Average equivalent flow per day through the Vadavar	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
June 1899	1st half	...	...	1,558	...	1,568	4,173	2,605	4,172	1	...	...	...	...
	2nd „		11,880	3,372	1,550	16,802	14,305	1,361	8,203	6,102	608	219	389	41
July 1899	1st half	...	17,555	4,305	2,533	24,393	19,741	372	18,389	1,352	873	297	576	58
	2nd „	...	497	...	168	665	2,018	1,353	1,078	940	263	160	103	17
August 1899	1st half	...	239	...	70	309	361	341	...	361	60	60	...	4
	2nd „	...	62	...	30	92	924	832	52	872	144	136	8	9
September 1899	1st half	...	1,927	...	540	2,467	4,202	2,222	2,872	1,330	418	241	177	28
	2nd „	...	5,127	...	912	6,039	7,084	2,298	5,640	1,444	579	297	282	39
October 1899	1st half	...	...	...	...	...	821	821	...	821	85	81	4	6
	2nd „	...	...	...	...	...	6,004	6,004	6,141	761	497	298	199	31
November 1899	1st half	...	...	...	...	...	956	956	204	752	190	181	9	13
	2nd „	...	...	...	...	...	427	427	...	427	44	44	...	3
December 1899	1st half	...	...	...	...	...	591	591	78	513	59	55	4	4
	2nd „	...	...	...	...	...	264	264	...	264	8	8	...	1
January 1899	1st half	...	...	...	...	...	72	72	...	72	...	...	...	...
	2nd „	...	...	..	...	...	75	75	...	75	...	...	...	...

APPENDIX K—*contd.*

Statement of discharges in the Coleroon showing the quantities used for irrigation of the Lower Anicut system.

1904-05.

Month	Fortnights	Upper anicut into Coleroon	Grand anicut into Coleroon	Discharge over the 150 yards Kalingula	Total of columns, 3, 4 and 5	Total discharge at Lower anicut	Quantity due to leakage, etc.	Lower anicut into Coleroon	Net quantity used for Irrigation (col. 7 = col. 9)	Quantity passed through the Vadavar	Quantity required for direct Irrigation 20 m. c. ft. per day	Net flow to Veeranam tank (col. 11 = col. 12)	Average equivalent flow per day through the Vadavar	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
June 1904	1st half	...	2,933	219	3,152	9,581	6,823	9,486	95	...	...	...	...	
	2nd „	27,237	11,403	1,947	40,467	42,895	5,626	41,616	1,279	884	240	644	59	
July 1904	1st half	38,736	17,439	2,166	61,494	82,954	24,284	81,030	2,813	1,432	300	1,132	95	
	2nd „	3,212	1,432	5,315	7,125	12,010	4,785	9,563	2,447	1,200	320	880	75	
August 1904	1st half	9,610	4,063	2,489	15,534	18,216	4,017	15,741	2,475	889	300	589	59	
	2nd „	233	2,274	1,861	3,329	7,532	4,203	6,138	1,931	920	320	600	58	
September 1904	1st half	...	...	822	...	823	823	...	823	354	167	187	24	
	2nd „	...	...	...	225	3,679	3,542	1,908	1,771	891	262	629	59	
October 1904	1st half	...	...	225	...	1,759	1,759	...	1,759	573	250	323	38	
	2nd „	...	2,629	...	2,774	7,506	4,747	5,269	2,237	1,180	320	860	74	
November 1904	1st half	...	...	145	...	1,021	1,021	...	1,021	244	134	110	16	
	2nd „	...	...	...	...	406	406	...	406	50	50	...	3	
December 1904	1st half	...	...	...	...	385	385	...	385	21	21	...	1	
	2nd „	...	...	...	...	555	555	...	555	178	117	61	11	
January 1905	1st half	...	...	...	...	304	304	...	304	20	20	...	1	
	2nd „	...	...	...	...	354	354	...	354	6	6	...	....	

Statement of discharges in the Coleroon showing the quantities used for irrigation of the Lower Anicut system.

1905-06.

Month	Fortnights	Upper anicut into Coleroon	Grand anicut into Coleroon	Discharge over the 150 yards Kalingula	Total of columns 3, 4 and 5	Total discharge at Lower anicut	Quantity due to leakage, etc.	Lower anicut into Coleroon	Net quantity used for Irrigation (col. 7 = col. 9)	Quantity passed through the Vadavar	Quantity required for direct Irrigation	Net flow to Veeranam tank (col. 11 = col. 12)	Average equivalent flow per day through the Vadavar	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
June 1905 ...	1st half ...	...	...	...	...	4,630	4,630	4,619	11	...	...	...	...	
	2nd „ ...	...	...	120	120	1,091	971	981	110	10	10	...	1	
July 1905 ...	1st half ...	7,091	7,733	1,613	16,437	15,034	2,463	12,198	2,836	929	300	629	62	
	2nd „ ...	23,916	11,142	2,278	37,345	47,162	11,445	43,031	4,131	841	226	615	46	
August 1905 ...	1st half ...	444	1,322	991	2,757	6,264	3,507	3,982	2,282	679	267	412	45	
	2nd „ ...	...	...	63	63	1,643	1,579	...	1,642	449	228	221	28	
September 1905 ...	1st half ...	2,488	4,470	465	8,823	6,469	1,552	4,051	2,418	1,073	300	773	72	
	2nd „ ...	...	...	27	27	1,495	1,468	...	1,495	324	166	158	22	
October 1905 ...	1st half ...	6,902	6,288	120	13,310	21,576	8,266	20,043	1,533	448	177	271	30	
	2nd „ ...	14,509	11,296	416	26,221	38,439	11,584	34,567	2,872	408	207	201	25	
November 1905 ...	1st half ...	...	...	...	...	1,239	1,239	...	1,239	418	157	261	28	
	2nd „ ...	...	...	...	...	1,866	1,866	460	1,406	875	300	575	58	
December 1905 ...	1st half ...	...	...	...	...	976	976	...	976	142	121	21	9	
	2nd „ ...	...	...	...	...	743	743	...	743	12	12	...	1	
January 1906 ...	1st half ...	...	...	...	...	769	769	...	769	8	8	...	1	
	2nd „ ...	...	...	...	...	1,381	1,381	408	973	227	131	96	14	

Statement of discharges in the Coleroon showing the quantities used for irrigation of the Lower Anicut system.

1906-07.

Month	Fortnights	Upper anicut into Coleroon	Grand anicut into Coleroon	Discharge over the 150 yards Kalingula	Total of columns 3, 4 and 5	Total discharge at Lower anicut	Quantity due to leakage, etc.	Lower anicut into Coleroon	Net quantity used for Irrigation (col. 7 = col. 9)	Quantity passed through the Vadavar	Quantity required for direct Irrigation	Net flow to Veeranam tank (col. 11 = col. 12)	Average equivalent flow per day through the Vadavar	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
June 1906	1st half	...	...	...	...	...	...	...	...	...	...	...	...	
	2nd „	657	...	657	...	...	...	...	...	...	...	...	...	
July 1906	1st half	..	...	...	...	397	397	...	397	47	47	...	3	
	2nd „	31,744	14,160	3,293	49,197	67,140	18,123	64,902	2,238	716	143	573	45	
August 1906	1st half	9,476	1,955	1,383	12,814	16,071	4,905	12,953	3,118	1,220	300	920	81	
	2nd „	41,070	15,877	2,668	59,615	48,544	10,243	45,730	3,174	1,511	320	1,191	94	
September 1906	1st half	11,058	1,673	1,438	14,169	15,912	2,674	13,144	2,798	1,055	289	766	70	
	2nd „	...	...	66	66	1,910	1,814	...	1,910	661	273	391	44	
October 1906	1st half	8,280	...	1,142	9,422	10,901	2,520	9,015	2,086	742	261	481	50	
	2nd „	24,335	...	332	24,667	38,250	14,947	35,579	2,668	1,407	320	1,087	88	
November 1906	1st half	...	...	...	...	11,881	11,881	10,006	1,875	789	294	495	53	
	2nd „	5,204	...	99	5,303	26,632	22,244	24,595	2,018	766	200	566	51	
December 1906	1st half	...	...	...	...	6,486	6,486	5,537	949	548	226	322	36	
	2nd „	...	...	42	42	4,626	4,584	2,608	1,929	706	287	419	44	
January 1907	1st half	...	...	...	...	1,437	1,137	...	1,437	294	172	122	20	
	2nd „	...	...	...	...	857	857	...	857	121	89	32	8	

XXV

APPENDIX L.

Abstract of Appendix IV of Madras case.

Showing the conditions of the Veeranam tank and the area irrigated under the Coleroon for the twenty years ending 1900-10.

Year	S. W. Monsoon			N. E. Monsoon			Total			Area irrigated	Remarks
	D	C	D & C	D	C	D & C	D	C	D & C		
1	2	3	4	5	6	7	8	9	10	11	12
1890-91 ...	...	1	...	...	3	...	...	4	...	113,336	
1891-92 ...	...	...	...	...	7	...	...	7	...	106,669	
1892-93 ...	1	1	...	...	...	...	1	1	...	111,217	
1893-94 ...	...	...	...	...	5	1	...	5	1	112,666	
1894-95 ...	...	...	...	...	3	...	...	3	...	111,666	
1895-96 ...	...	2	...	...	9	...	...	11	...	111,251	
1896-97 ...	1	...	...	...	6	...	1	6	...	106,844	
1897-98 ...	3	...	3	1	...	3	4	...	6	111,267	
1898-99 ...	...	...	...	...	5	6	...	5	6	117,724	
1899-00 ...	...	...	...	...	4	...	...	4	...	99,301	
1900-01 ...	4	1	3	...	4	...	4	5	3	110,568	
1901-02 ...	...	2	...	...	4	3	...	6	3	108,686	
1902-03 ...	1	...	1	...	9	4	1	9	5	108,057	
1903-04 ...	1	1	1	1	6	6	2	7	7	109,237	
1904-05 ...	2	1	...	...	4	...	2	5	...	109,385	
1905-06 ...	...	1	...	...	4	1	...	5	1	109,443	
1906-07 ...	...	...	2	...	3	2	...	3	4	111,197	
1907-08 ...	...	...	...	...	5	1	...	5	1	111,201	
1908-09 ...	...	3	...	...	2	1	...	5	1	114,738	
1909-10 ...	2	1	4	1	...	...	3	1	4	113,961	

APPENDIX M.

Discharges of the river Bhavani at the Kodiveri Anicut (in millions of cubic feet).

Years	January		February		March		April		May		June		July		August		September		October		November		December		Total for anicut and head sluice in m. cft. for the year	Total for the year in m. cft.
	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice		
	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.		
1890 ...	59	875 338	1,382	270 90	1,849	... ..	356	713 281	400	739 271	1,791	836 321	7,752	1,295 792	5,387	1,287 576	2,339	1,116 472	4,414	1,161 514	3,266	1,137 456	865	1,045 379	10,474 29,861 4,490	44,825
1891 ...	412	648 214	2,281	672 238	1,769	253 159	543	194 103	10	480 163	238	853 332	26,985	1,343 902	8,816	1,313 675	2,433	1,156 664	22,936	1,459 912	5,936	1,264 428	1,681	1,087 436	10,722 74,040 5,226	89,988
1892 ...	190	920 416	752	186 67	232	... ...	392	286 58	295	781 296	1,857	1,009 440	23,211	1,491 836	9,342	1,468 814	4,387	1,199 480	5,027	1,270 585	1,482	1,038 416	274	911 357	10,559 47,441 4,765	62,765
1893 ...	...	642 230	663	166 75	6,634	... ...	1,757	179 42	212	821 320	9,021	1,177 724	5,033	1,253 500	7,289	1,297 503	4,851	1,225 492	11,562	1,440 561	17,297	1,570 558	3,529	1,190 480	10,960 67,848 4,485	83,293
1894 ...	971	1,035 413	660	424 155	592	... ...	760	250 59	110	729 272	4,989	1,166 454	10,670	1,367 519	6,834	1,360 550	3,249	1,144 463	3,882	1,197 471	2,522	1,098 449	359	906 358	10,676 35,588 4,163	50,427
1895 ..	...	571 197	50	175 19	381	... ...	2,342	451 176	114	554 187	15,352	967 350	9,572	1,328 594	12,358	1,353 576	2,279	1,097 438	7,745	1,392 559	4,393	1,093 471	593	940 383	9,921 55,179 3,950	69,050
1896 ...	958	956 376	...	296 102	..	... ..	...	97 16	...	258 51	24,845	1,003 390	9,287	1,648 570	22,834	1,716 610	5,858	1,285 506	5,451	1,293 511	4,772	1,198 333	6,713	1,337 441	11,087 80,718 3,906	95,711
1897 ...	979	995 412	949	208 77	553	... ...	732	252 127	176	631 228	11,470	1,210 463	18,238	1,518 568	20,947	1,725 568	7,121	1,358 512	6,132	1,334 534	2,425	1,102 442	543	999 396	11,362 70,265 4,357	85,984
1898 ...	31	745 278	1,686	114 38	134	... ...	210	375 ...	118	573 200	7,037	1,088 406	9,900	1,336 503	3,440	1,211 470	5,946	1,283 518	10,600	1,405 524	7,730	1,219 527	2,668	1,125 460	10,474 49,500 3,924	63,898
1899 ...	475	704 396	409	180 180	...	175 40	2,956	481 102	...	691 258	7,182	1,075 420	6,877	1,316 510	1,728	1,086 435	4,067	1,184 463	2,477	1,136 359	368	886 351	408	721 268	9,635 26,947 3,782	40,364
1900 ...	717	596 176	...	236 45	82	126 ...	210	114 58	273	291 153	10,615	976 358	25,143	1,761 609	33,286	1,740 593	7,749	1,379 555	9,088	1,415 527	4,586	1,136 481	1,448	1,070 429	10,840 93,197 3,984	1,08,021

Discharges of the river Bhavani at the Kodiveri Anicut (in millions of cubic feet).

Years	January		February		March		April		May		June		July		August		September		October		November		December		Total for anicut and head sluice in m. cft. for the year	Total for the year in m.cft.
	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice	Over anicut	Through head sluice		
	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.	m.cft.		
1901 ...	2,450	881	785	334	1,822	...	770	212	395	792	7.305	1,041	16,906	1,538	6,706	1,370	6,655	1,212	11,423	1,413	5,011	1,227	3,157	1,173	11,223	79,834
		538		111		...		107		299		383		946		540		504		719		636		473	63,385 / 5,226	
1902 ...	2,570	1,063	654	261	1,346	...	625	253	417	791	1,378	855	28,569	1,478	6,366	1,313	9,351	1,378	7,576	1,245	9,590	1,152	17,839	1,230	11,019	1,01,549
		411		93		...		81		306		328		490		531		530		467		451		531	86,281 / 4,249	
1903 ...	2,157	855	146	399	...	474	279	235	1,213	851	3,078	1,035	39,525	1,560	15,785	1,439	8,931	1,413	11,034	1,262	12,267	1,085	4,509	1,178	11,786	1,16,261
		425		251		173		73		359		406		870		678		636		603		615		462	98,924 / 5,551	
1904 ..	1,883	938	488	393	...	445	...	297	1,292	891	19,909	1,389	15,230	1,540	9,659	1,419	7,053	1,384	4,908	1,359	1,491	1,076	322	917	12,048	78,318
		338		235		...		105		320		548		459		533		578		154		410		355	62,235 / 4,035	
1905 ...	100	702	621	198	...	363	7	280	472	660	8,442	1,055	15,518	1,498	4,671	1,271	6,628	1,278	16,656	1,332	5,195	1,240	2,041	1,091	10,973	76,131
		271		61		215		98		242		449		665		501		495		890		483		437	60,351 / 4,807	
1906 ...	794	544	514	297	2,161	..	121	39	...	117	2,097	281	16,169	692	16,578	670	5,697	526	5,531	527	2,632	466	4,080	462	4,621	71,646
		994		274		...		147		372		783		1,604		1,396		1,243		1,346		1,163		1,130	56,574 / 10,452	
1907 ...	1,616	341	169	75	936	35	235	332	...	201	501	531	1,667	692	2,637	888	380	495	674	563	713	511	274	483	5,150	23,654
		695		217		...		261		569		1,133		87		672		1,226		1,317		1,308		1,214	9,805 / 8,699	
1908 ...	814	664	101	256	96	...	1,178	157	389	231	2,214	301	16,198	742	11,218	604	2,513	417	6,001	552	2,460	441	148	318	4,677	57,484
		632		246		...		230		628		797		1,424		1,381		1,056		1,084		1,018		838	43,383 / 9,421	
1909 ..	6,879	1,066	879	500	65	...	402	237	5,292	754	15,603	792	20,314	855	8,666	534	5,609	557	5,917	556	2,805	454	1,803	496	6,851	91,776
		634		178		...		271		642		1,223		1,411		1,439		1,285		1,316		1,143		1,099	74,234 / 10,691	
1910 ...	1,078	358	1,144	215	...	...	...	47	213	221	6,220	463	14,465	736	15,859	754	5,607	537	11,886	782	16,265	749	2,914	474	5,338	91,128
		707		192		...		159		608		902		1,267		1,512		1,302		1,294		1,048		1,148	75,651 / 10,139	
1911 ...	904	376	1,020	110	639	...	361	102	14	224	28,382	1,105	26,621	1,516	4,441	544	1,426	415	3,861	602	4,582	501	3,573	548	6,043	92,788
		753		204		...		242		678		1,209		1,831		1,293		1,066		1,267		1,122		1,256	75,824 / 10,921	

Discharges of river Amaravathi at Pallapalayam Anicut (in millions of cubic feet).

Years	January	February	March	April	May	June.	July	August	September	October	November	December	Total	Remarks
02	1086·75	.....	.. ...	.....	248·90	.....	1139·28	17·71	17·71	4790·57	3561·77	8933·68	19796·37	
03	141·68	.....	.....	.....	232·73	.....	3258·95	2632·08	1242·97	686·92	1289·89	5268·78	14754·00	
04	1140·93	.....	.....	.....	963·84	1567·19	2536·17	654·13	67·73	707·26	.....	.....	7637·25	
05	.....	.....	.....	.....	184·54	418·08	637·18	.....	88·55	1254·38	361·81	.....	2954·54	
06	.....	.....	.....	.....	.....	202·35	1273·31	1599·04	16·24	717·49	3778·30	2901·52	10488·25	
07	219·92	.....	.....	.....	265·86	148·66	1438·19	737·87	17·75	816·13	2400·90	.....	6045·28	
08	.....	49·92	.....	.....	67·09	.....	.....	.....	.....	.....	.. ...	.....	117·01	
09	.....	.....	.....	.....	85·75	948·84	1005.04	589·42	309·15	1527·23	85·02	35·60	4586·05	
10	.....	.....	.....	.....	150·94	447·97	980·52	1874·86	424·35	2277·92	3179·27	141·68	9477·51	

APPENDIX M—*concld.*

Discharge of the river Noyel at Chitrachavadi Anicut (in millions of cubic feet).

Years	January	February	March	April	May	June	July	August	September	October	November	December	Total	Remarks
1890 ...	.....	.....	11·68	23·36	.....	4·97	177·15	25·17	.....	238·10	57·38	...	537·81	
1891 ...	.....	.....	.....	.....	.....	.....	753·00	54·00	.....	350·00	19·00	.....	1176·00	
1892 ...	.....	.....	.....	.....	.....	.....	606·33	.....	.....	.....	.....	.....	606·33	
1893 ...	.....	.....	.....	.....	.....	59·51	.....	.....	.....	227·82	1220·50	.....	1507·83	
1894 ...	.....	101·60	.....	.....	.....	152·41	210·33	.....	.....	.....	.....	.....	464·34	
1895 ...	.....	.....	.....	67·06	.....	1251·79	90·52	201·17	.....	.....	.....	.....	1610·54	
1896 ...	...	.....	.....	.....	.....	1132·28	1891·11	1727·72	29·92	79·33	74·98	78·95	5014·29	
1897 ...	16.26	.....	.....	.....	.....	472·68	853·80	1117·99	67·78	.....	.....	.....	2528·46	
1898 ...	.....	.....	.....	.....	.....	230·11	236·23	.....	.....	648·84	91·45	.....	1206·63	
1899 ...	.....	.....	.....	.....	.....	126·49	53·54	.....	18·30	108·66	.....	.....	806·99	
1900 ...	.....	.....	.....	3·18	2·11	1147·78	2268·22	3711·57	61·58	465·67	198·70	8·88	7867·19	
1901 ...	0·38	19·26	.....	.....	.....	156·89	740·50	19·18	4·43	0·78	260·12	105 50	1307·04	
1902 ...	163·97	.....	.....	22·03	.....	20·74	1312·08	.....	122·34	764·98	510·62	1413·93	4330·69	
1903 ...	205·38	.....	.....	24·62	.....	1·14	2119·52	659·15	242·27	377·87	105·57	2·12	3737·64	
1904 ...	21·70	.....	.....	.....	.....	1332·88	996·53	108·34	.....	345·94	.....	.....	2805·39	
1905 ...	.....	.....	.....	.....	.....	62·88	509·24	.....	.....	329·22	6·99	.....	908·33	
1906 ...	.....	.....	.....	.....	.....	.....	272·31	456·72	.....	.....	.....	107·43	836·46	
1907 ...	.....	.....	.....	4·48	.....	287·94	217·35	228·87	4·01	140·86	36·92	143·17	1063·63	
1908 ...	.....	.....	4·47	.....	.....	32·40	60·31	142·46	.....	516·85	.....	.....	756·49	
1909 ...	53·06	.....	.....	7·33	441·50	734·28	398·76	10·87	.....	28·23	.....	.....	1674·03	
1910 ...	.....	.....	.....	.....	.....	79·13	544·53	1056·90	.....	76·71	98·05	.....	1869·36	

3153

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APPENDIX N.

Madras Table N. Improved.

Column 1, Month and date.

Column 2 gives the flow at Kannambadi in m. c. ft., corresponding to the date in column 1. This also gives the quantity to be impounded day after day.

Columns 3 to 15 correspond to columns 3 to 15 respectively, described under Table III—Appendix P.

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 +col.6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 16	Compensation water converted to Kannambdi, i.e., ¾ of col. 6	Draw—off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
June 1905 1	...	322	...	322	...	322	...	...	10,000	...	43	...	43	9,957	
2	...	272	...	272	...	272	...	...	9,957	...	43	...	43	9,914	
3	...	272	...	272	...	272	...	...	9,914	...	43	...	43	9,871	
4	...	218	...	218	...	218	...	...	9,871	...	43	...	43	9,828	
5	...	370	...	370	...	370	...	...	9,828	...	43	...	43	9,785	
6	...	322	...	322	...	322	...	...	9,785	...	43	...	43	9,742	
7	...	290	...	290	...	290	...	...	9,742	...	43	...	43	9,699	
8	1	236	1	235	1	235	...	...	9,700	...	43	...	43	9,657	
9	1	236	1	235	1	235	...	...	9,658	...	43	...	43	9,615	
10	1	200	1	199	1	199	...	...	9,616	...	43	...	43	9,573	
11	1	218	1	217	1	218	...	...	9,574	1	43	...	44	9,530	
12	95	254	71	183	71	184	...	...	9,625	1	43	...	44	9,581	
13	641	200	481	281	481	—280	...	...	10,222	1	43	...	44	10,128	
14	151	158	113	45	113	46	...	...	10,329	1	43	...	44	10,285	
15	33	130	25	105	25	176	...	...	10,318	95	43	...	138	10,180	
	...	...	..	...	694	...	...	...	...	...	...	...	...	...	
16	132	186	99	87	99	568	...	...	10,312	641	152	...	793	9,519	
17	132	186	99	87	99	200	...	...	9,651	151	152	...	303	9,348	
18	138	158	103	55	103	80	...	...	9,486	33	152	..	185	9,301	
19	160	130	120	10	120	109	...	...	9,461	132	152	...	284	9,177	
20	1,447	594	1,085	—491	594	—302	...	...	10,624	132	152	...	284	10,340	
21	1,263	538	947	—409	538	—306	...	...	11,608	138	152	...	290	11,316	
22	210	1,818	158	1,660	158	1,780	...	...	11,523	160	152	...	312	11,211	
23	177	1,287	133	1,154	133	1,748	..	...	11,388	792	152	...	944	10,444	
24	144	851	108	743	108	1,281	...	...	10,588	717	152	...	869	9,719	
25	135	662	101	561	101	719	...	...	9,854	210	152	...	362	9,492	
26	328	594	246	348	246	481	...	...	9,820	177	152	...	329	9,491	
27	328	754	246	508	246	616	...	...	9,819	144	152	...	296	9,523	
28	405	1,579	304	1,275	304	1,376	...	...	9,928	135	152	...	287	9,641	
29	569	3,697	427	3,270	...	3,516	1,216	246	10,210	328	152	...	480	9,730	
30	723	3,638	542	3,096	...	3,342	1,012	246	10,453	328	152	...	480	9,973	
	...	...	...	...	2,849	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13	Compensation water due to excess storage, col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
July 1905.															
1	1,141	3,802	856	2,916	...	3,250	950	301	11,114	405	156	...	561	10,553	
2	1,172	3,680	879	2,801	...	2,801	501	...	11,725	...	156	...	156	11,569	
3	1,044	2,831	783	2,051	249	2,051	...	...	12,613	...	156	...	156	12,457	
4	855	2,020	641	1,379	641	1,379	...	...	13,312	...	156	...	156	13,156	
5	676	1,495	507	988	507	988	...	...	13,832	...	156	...	156	13,676	
6	612	1,000	459	541	459	890	...	...	14,288	332	156	...	188	13,800	
7	584	730	438	292	438	933	...	...	14,384	855	156	...	1,011	13,373	
8	2,714	730	2,036	—1,306	730	—799	...	...	16,087	676	156	...	832	15,255	
9	2,801	4,077	2,303	1,971	326	2,433	133	133	18,059	612	156	...	768	17,291	
10	1,991	3,161	1,492	1,668	632	2,106	...	...	19,282	584	156	...	740	18,542	
11	795	2,160	596	1,564	596	2,291	...	...	19,337	974	156	...	1,130	18,207	
12	631	1,625	473	1,152	473	1,478	...	...	18,838	435	156	...	591	18,247	
13	654	1,240	490	750	490	1,382	...	...	18,901	813	156	...	999	17,902	
14	573	892	429	463	429	1,059	...	...	18,475	795	156	...	951	17,521	
15	534	628	400	228	400	701	...	...	18,058	631	156	...	787	17,271	
	...	...	...	...	6,370	...	437	...	...	...	...	...	...	...	
16	556	538	417	121	417	611	...	...	17,827	651	156	..	810	17,017	
17	556	472	417	55	417	484	...	...	17,573	573	156	...	729	16,844	
18	556	516	417	99	417	499	...	...	17,400	534	156	...	690	16,710	
19	1,233	628	928	—297	628	120	...	...	17,943	556	156	...	712	17,231	
20	1,802	3,657	1,351	2,306	...	2,723	423	417	19,033	556	156	...	712	18,321	
21	4,017	7,516	3,003	4,503	...	4,920	2,620	417	22,338	556	156	...	712	21,626	
22	5,921	7,859	4,441	3,118	...	4,016	1,716	628	27,550	837	156	...	993	26,557	
23	6,695	8,003	5,021	2,982	...	2,982	682	...	33,252	...	156	...	156	33,096	
24	6,095	6,516	4,501	3,411	...	3,411	1,111	...	39,101	...	156	1,865	2,021	37,080	
25	3,606	4,664	2,704	4,548	...	4,548	2,248	...	40,686	...	156	3,450	3,606	37,080	
26	2,770	4,585	2,077	4,394	...	4,394	2,094	...	39,850	...	156	2,514	2,770	37,080	
27	2,486	4,130	1,864	4,016	...	4,016	1,716	...	39,566	...	156	2,330	2,486	37,080	
28	2,173	4,033	1,630	4,016	...	4,016	1,716	...	39,253	...	156	2,017	2,173	37,080	
29	2,029	3,016	1,522	2,699	...	2,899	599	...	39,109	...	156	1,873	2,029	37,080	
30	1,958	2,698	1,469	3,135	...	3,135	835	...	39,038	...	156	2,542	1,958	37,080	
31	1,821	2,650	1,366	2,533	...	2,533	233	...	38,901	...	156	1,665	1,821	37,080	
	...	...	...	...	1,879	...	1,462	...	...	...	...	...	...	..	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (⅔ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+⅓ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6 ; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ⅓ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
August 1905.															
1	1,382	2,440	1,037	2,333	...	2,333	...	...	38,462	...	156	1,226	1,382	37,080	
2	1,733	2,222	1,300	2,105	117	2,105	...	...	38,813	...	156	1,577	1,733	37,080	
3	1,676	2,074	1,257	1,957	117	1,957	...	...	38,756	...	156	1,520	1,676	37,080	
4	994	1,859	745	1,742	117	1,742	...	...	38,074	...	156	838	994	37,080	
5	549	1,573	412	1,339	234	1,456	...	...	37,629	156	156	237	549	37,080	
6	709	1,222	532	988	234	1,105	...	...	37,789	156	156	397	709	37,080	
7	666	981	500	747	234	864	...	...	37,746	156	156	354	666	37,080	
8	592	803	444	452	351	686	...	...	37,672	312	156	124	592	37,080	
9	595	662	446	311	351	545	...	...	37,675	312	156	127	595	37,080	
10	561	594	421	243	351	477	...	...	37,641	312	156	93	561	37,080	
11	561	560	421	139	421	490	...	...	37,641	468	156	...	624	37,017	
12	658	538	494	44	494	395	...	...	37,675	468	156	...	624	37,051	
13	545	516	409	107	409	458	...	...	37,596	468	156	...	624	36,972	
14	379	594	282	312	282	733	...	...	37,351	561	156	...	717	36,634	
15	665	784	424	360	424	854	...	...	37,199	658	156	...	814	36,385	
	...	...	...	...	4,136	...	...	...	...	...	...	...	...	...	
16	556	628	417	211	417	620	...	...	36,941	545	156	...	701	36,241	
17	731	538	548	—10	538	272	...	...	36,972	376	156	...	532	36,440	
18	731	516	548	—32	516	392	...	...	37,171	665	156	...	721	36,450	
19	731	696	548	48	548	465	...	...	37,181	556	156	...	712	36,459	
20	689	851	517	334	517	872	...	...	37,158	717	156	...	873	36,285	
21	763	1,116	572	544	572	1,060	...	...	37,048	688	156	...	844	36,204	
22	1,134	1,116	850	266	850	814	...	...	37,338	721	156	...	877	36,431	
23	1,304	1,116	978	138	978	655	...	...	37,765	689	156	...	845	36,920	
24	922	1,062	692	370	692	942	...	...	37,842	763	156	...	919	36,923	
25	1,094	1,116	820	296	820	1,146	...	...	38,017	1,133	156	...	1,289	36,728	
26	1,534	1,170	1,150	20	1,150	998	...	...	38,262	1,304	156	...	1,460	36,802	
27	1,059	1,345	794	551	794	1,243	...	...	37,861	922	156	...	1,078	36,783	
28	985	1,345	741	604	741	1,424	...	...	37,768	1,094	156	...	1,250	36,518	
29	1,057	1,696	793	903	793	2,053	...	...	37,575	1,534	156	...	1,690	35,885	
30	1,074	1,696	806	890	806	1,684	...	...	36,959	1,059	156	...	1,215	35,744	
31	981	1,755	736	1,019	736	1,760	...	...	36,725	988	156	...	1,141	35,584	
	...	...	...	...	11,468	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (2 of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4) +3 of surplus in col. 13.	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, 4 of col. 6	Draw-off for irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
September 1905. 1	879	1,755	659	1,096	659	1,889	...	...	36,463	1,057	156	...	1,213	35,250	
2	782	1,170	586	584	586	1,390	...	...	36,032	1,074	156	...	1,230	34,802	
3	750	851	562	289	562	1,025	...	...	35,552	981	156	...	1,137	34,415	
4	847	892	635	257	635	916	...	...	35,262	879	156	...	1,035	34,227	
5	584	838	438	400	438	986	...	...	34,811	782	156	...	938	33,873	
6	869	784	652	132	652	694	...	...	34,742	750	156	...	906	33,836	
7	1,163	838	872	—34	838	601	...	...	34,992	847	156	...	1,003	33,996	
8	1,392	1,536	1,044	490	1,044	928	...	...	35,388	581	156	...	740	34,648	
9	1,503	2,320	1,127	1,193	1,107	1,815	...	...	36,151	869	156	...	1,025	35,126	
10	1,471	2,089	1,103	986	1,103	1,824	...	...	36,597	1,163	156	...	1,319	35,278	
11	1,136	1,798	852	946	852	1,990	...	...	36,414	1,392	156	...	1,548	34,866	
12	1,035	1,495	776	719	776	1,826	...	...	35,901	1,476	156	...	1,632	34,269	
13	997	1,300	747	553	747	1,656	...	...	35,266	1,471	156	...	1,627	33,639	
14	646	1,060	484	576	484	1,428	...	...	34,285	1,136	156	...	1,292	32,993	
15	616	1,365	462	903	462	1,679	...	...	33,609	1,035	156	...	1,191	32,418	
	...	...	...	...	10,945	...	...	...	...	...	...	...	...	...	
16	457	730	343	387	343	1,134	...	...	32,875	997	156	...	1,153	31,722	
17	431	662	323	339	323	823	...	...	32,153	646	156	...	802	31,351	
18	383	1,365	287	1,078	287	1,540	...	...	31,734	616	156	...	772	30,962	
19	374	730	280	450	280	793	...	...	31,336	457	156	...	613	30,723	
20	355	594	266	328	266	651	...	...	31,078	431	156	...	587	30,491	
21	300	494	225	269	225	556	...	...	30,791	383	156	...	539	30,252	
22	290	450	217	233	217	513	...	...	30,542	374	156	...	530	30,012	
23	278	434	208	226	208	492	...	...	30,290	355	156	...	511	29,779	
24	238	386	178	208	178	433	...	...	30,017	300	156	...	456	29,561	
25	248	354	178	176	178	393	...	...	29,799	290	156	...	446	29,353	
26	267	338	200	138	200	346	...	...	29,620	278	156	...	434	29,186	
27	268	338	201	137	201	323	...	...	29,444	298	156	...	394	29,050	
28	217	338	163	175	163	353	...	...	29,277	218	156	...	394	28,883	
29	206	338	154	185	154	385	...	...	29,089	267	156	...	423	28,866	
30	145	322	109	113	109	306	...	...	28,811	268	156	...	424	28,387	
	...	...	...	...	3,332	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4) + ¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
October 1905. 1	142	322	107	215	107	378	...	...	28,529	217	156	...	373	28,156	
2	142	322	107	215	107	369	...	...	28,298	206	156	..	362	27,936	
3	174	333	130	208	130	417	...	...	28,110	145	156	..	301	27,809	
4	237	1.062	178	884	178	991	...	...	28,016	142	156	...	298	27,748	
5	201	628	151	477	151	584	...	...	27,949	142	156	...	298	27,651	
6	214	472	160	312	160	442	...	...	27,865	171	156	...	330	27,535	
7	237	851	178	673	178	851	...	...	27,772	237	156	...	303	27,379	
8	196	3,336	147	3,189	...	3,340	1,010	151	27,575	201	156	...	357	27,218	
9	181	2,346	146	2,200	100	2,360	60	60	27,399	214	156	...	370	27,029	
10	159	3.140	119	3,021	...	3,199	899	178	27,188	237	156	...	393	26,795	
11	258	2.178	193	1,985	193	1,985	...	...	27,053	...	156	...	156	26,897	
12	595	2,192	446	1,746	446	1,846	...	...	27,492	133	156	...	289	27,203	
13	914	4,892	685	4,207	...	4.207	1,907	...	28,117	..	156	...	156	28,061	
14	1,245	3,879	909	2,970	...	3,163	863	193	29,306	258	156	...	414	28,892	
15	2,761	3,870	2,071	1,799	501	2,245	...	...	31,653	595	156	...	751	30,902	
	...	...	...	...	2,251	...	...	582	...	...	...	...	...	...	
16	1,415	4,190	1,061	3.129	...	3,129	829	...	32,317	...	156	...	156	32,161	
17	912	3.001	684	2,317	...	2,317	17	...	33,073	...	156	...	156	32,917	
18	726	2,305	544	1,761	539	2,262	...	...	33,613	601	156	...	757	32,886	
19	559	2,353	419	1.934	366	1,934	...	...	33,445	...	156	...	156	32,289	
20	750	1,018	562	486	562	486	...	...	34,039	...	156	...	156	33,883	
21	493	1,000	370	630	370	1,169	...	...	34,376	719	156	...	875	33,501	
22	414	838	310	528	310	891	...	...	33,915	488	156	...	644	33,271	
23	348	662	261	401	261	963	...	...	33,619	750	156	...	906	32,713	
24	278	560	208	352	208	722	...	...	32 991	493	156	...	649	32,342	
25	205	516	151	362	154	672	...	...	32,547	414	156	...	570	31,977	
26	207	450	155	295	155	556	...	...	32,184	662	155	...	818	31,366	
27	174	418	130	288	130	496	...	...	31,540	278	156	...	434	31,106	
28	139	402	101	298	101	452	...	...	31,245	205	156	...	361	30,884	
29	139	370	101	266	101	421	...	...	31,023	207	156	...	363	30,666	
30	146	354	109	145	109	275	...	...	30,806	174	156	...	330	30,476	
31	114	338	85	253	85	357	...	...	30,362	139	156	...	295	30,067	
	...	...	...	...	3,457	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (3 of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4) + 3 of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, 4 of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
														30,067	
1	112	322	84	238	84	312	...	...	30,179	139	156	...	295	29,881	
2	112	306	84	222	81	331	...	...	29,996	145	156	...	301	29,695	
3	93	218	70	148	70	233	...	...	29,785	113	156	...	269	29,516	
4	93	272	70	202	70	286	...	...	29,609	112	156	...	268	29,341	
5	97	236	73	163	73	217	...	...	29,438	112	156	...	268	29,170	
6	97	236	73	163	73	233	...	...	29,267	93	156	...	249	29,018	
7	97	236	73	163	73	233	...	...	29,115	93	156	...	249	28,866	
8	126	236	95	141	95	214	...	...	28,992	97	156	...	253	28,739	
9	117	236	88	148	88	221	...	...	28,856	97	156	...	253	28,603	
10	89	251	67	187	67	260	...	...	28,692	97	156	...	253	28,439	
11	89	402	67	335	67	430	...	...	28,528	127	156	...	283	28,245	
12	89	322	67	255	67	343	...	...	28,331	117	156	...	273	28,061	
13	76	306	57	249	57	316	...	...	28,137	89	156	...	245	27,892	
14	76	306	57	249	57	316	...	...	27,968	89	156	...	245	27,723	
15	64	272	48	224	48	281	...	...	27,787	89	156	...	245	27,542	
	1,427	4,160	...	...	...	...	...	...	...	...	...	...	...	...	
16	65	251	49	205	49	262	...	...	27,607	76	156	...	232	27,375	
17	71	290	53	237	53	294	...	...	27,446	76	156	...	232	27,214	
18	71	370	53	317	53	365	...	...	27,285	61	156	...	220	27,065	
19	71	338	53	285	53	334	...	...	27,136	65	156	...	221	26,915	
20	71	322	53	269	53	322	...	...	26,986	71	156	...	227	26,759	
21	71	322	53	269	53	322	...	...	26,830	71	156	...	227	26,603	
22	69	322	52	270	52	323	...	...	26,672	71	156	...	227	26,445	
23	69	322	52	270	52	323	...	...	26,514	71	156	...	227	26,287	
24	69	338	52	286	52	339	...	...	26,356	71	156	...	227	26,129	
25	69	560	52	508	52	560	...	...	26,198	69	156	...	225	25,973	
26	84	431	63	371	63	423	...	...	26,057	69	156	...	225	25,832	
27	145	386	109	277	109	329	...	...	25,977	69	156	...	225	25,752	
28	190	351	143	211	143	263	...	...	25,942	69	156	...	225	25,717	
29	177	338	133	205	133	268	...	...	25,894	81	156	...	240	25,654	
30	93	322	70	252	70	361	...	...	25,747	145	156	...	301	25,446	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

November 1905.

Month and date		Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
		Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (⅔ of col. 2)	Net flow at Cauvery Dam (col. 3—cols. 4)+⅔ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi *i.e.*, ⅓ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols 11,12 and 13	Balance in Reservoir	
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
December 1905.															25,446	
	1	128	338	96	242	96	...	...	...	25,574	191	156	...	347	25,227	
	2	71	354	53	351	53	...	...	...	25,298	177	156	...	333	24,965	
	3	71	338	53	285	53	...	..	...	25,036	88	156	...	244	24,792	
	4	70	322	52	270	52	...	...	...	24,862	128	156	...	284	24,578	
	5	76	322	57	265	57	...	...	...	24,664	71	156	...	227	24,427	
	6	83	290	62	228	62	...	...	...	24,510	71	156	...	227	24,283	
	7	67	272	50	222	50	...	...	...	24,350	70	156	...	226	24,124	
	8	61	254	46	208	46	...	...	...	24,185	76	156	...	228	23,957	
	9	61	236	46	190	46	...	...	...	24,018	83	156	...	239	23,779	
	10	58	218	44	174	44	...	...	...	23,837	67	156	...	223	23,614	
	11	58	218	44	174	44	...	...	...	23,672	61	156	...	217	23,455	
	12	58	200	44	156	44	...	...	...	23,513	61	156	...	217	23,296	
	13	58	186	44	142	44	...	...	...	23,354	58	156	...	214	23,140	
	14	58	186	44	142	44	...	...	...	23,198	59	156	...	214	22,984	
	15	58	186	44	142	44	...	...	...	23,042	59	156	...	214	22,828	
		1,036	3,920	...	...	...	...	...	...	...	...	...	...	...	...	
	16	56	186	42	144	42	...	...	...	22,884	59	156	...	214	22,670	
	17	60	172	45	127	45	...	..	...	22,730	59	156	...	214	22,516	
	18	12	158	9	149	9	...	...	...	22,528	59	156	...	214	22,314	
	19	12	158	9	149	9	...	...	..	22,326	56	156	...	212	22,114	
	20	265	144	199	—55	199	...	...	...	22,379	60	156	...	216	22,163	
	21	265	144	199	—55	199	..	...	...	22,428	12	156	...	168	22,260	
	22	265	98	199	—101	199	...	...	...	22,525	12	156	...	168	22,357	
	23	...	82	...	..	...	...	...	...	22,357	265	156	...	421	21,936	
	24	...	82	...	...	...	...	...	...	21,936	265	156	...	421	21,515	
	25	...	50	...	...	...	...	...	...	21,515	265	156	...	421	21,094	
	26		66	...	...	...	...	...	...	21,094	...	156	...	156	20,938	
	27	16	44	12	32	12	...	...	...	20,954	...	156	..	156	20,798	
	28	16	32	12	20	12	...	...	...	20,814	...	156	...	156	20,658	
	29	16	32	12	20	12	...	...	...	20,674	..	156	...	156	20,518	
	30	16	32	12	20	12	...	...	...	20,534	16	156	...	172	20,362	
	31	23	26	17	9	17	...	...	...	20,385	16	156	...	172	20,213	
	...	1,022	1,506	...	...	...	...	...	..	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (⅜ of col. 2)	Now flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ⅜ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
														20,213	
1	14	20	11	9	11	..	...	...	20,227	16	156	...	172	20,055	
2	20	20	15	5	15	...	...	...	20,075	16	156	...	172	19,903	
3	20	20	15	5	15	...	...	...	19,923	23	156	...	179	19,744	
4	20	16	15	1	15	...	...	...	19,764	14	156	...	170	19,594	
5	20	16	15	1	15	...	...	...	19,614	20	156	...	176	19,438	
6	20	8	15	—7	15	...	...	...	19,458	20	167	...	187	19,271	
7	25	8	19	—11	19	...	...	...	19,296	20	167	...	187	19,109	
8	25	8	19	—11	19	...	...	...	19,134	20	167	...	187	18,947	
9	14	8	11	—3	11	...	...	...	18,961	20	167	...	187	18,774	
10	14	8	11	—3	11	...	...	...	18,788	25	167	...	192	18,596	
11	136	4	102	—98	102	...	...	...	18,732	25	167	...	192	18,540	
12	27	4	20	—16	20	...	...	...	18,567	14	167	...	181	18,386	
13	28	4	21	—17	21	...	...	...	18,414	14	167	...	181	18,233	
14	41	8	33	—25	33	...	...	...	18,277	136	167	...	303	17,974	
15	301	16	226	—210	226	...	...	...	18,275	27	156	...	183	18,092	
January 1906.	728	168	...	...	...	...	...	...	..	...	...	...	...	...	
16	301	12	...	...	...	...	...	...	...	28	49	...	77	18,015	
17	301	12	...	...	...	...	...	...	...	44	49	...	93	17,922	
18	301	16	...	...	...	...	...	...	...	301	49	...	350	17,572	
19	301	338	...	...	...	...	...	...	...	...	49	...	49	17,523	
20	301	200	...	...	...	...	...	...	...	...	49	...	49	17,474	
21	64	172	...	...	...	...	...	...	...	...	49	...	49	17,425	
22	64	144	...	...	...	...	...	...	...	...	49	...	49	17,376	
23	64	114	...	...	...	...	...	...	...	...	49	...	49	17,327	
24	55	98	...	...	...	...	...	...	...	...	49	...	49	17,252	
25	49	66	...	...	...	...	...	...	...	...	49	...	49	17,203	
26	49	82	...	...	...	...	...	...	...	...	49	...	42	17,154	
27	35	50	...	...	...	...	...	...	...	...	49	...	49	17,105	
28	35	44	...	...	...	...	...	...	...	...	49	...	49	17,056	
29	27	44	...	...	...	...	...	...	...	...	49	...	49	17,007	
30	28	44	...	...	...	...	...	...	...	...	49	...	49	16,958	
31	27	38	...	...	...	...	...	...	...	...	49	...	49	16,909	
	2,022	1,474	...	...	...	...	...	...	..	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
February 1906. 1	28	38	21	...	...	...	...	...	...	...	49	...	49	16,860	
2	23	32	17	...	...	...	...	...	...	...	49	...	49	16,811	
3	23	32	17	...	...	...	...	...	...	...	49	...	49	16,762	
4	23	32	17	...	...	...	...	...	...	...	49	...	49	16,713	
5	23	20	17	...	...	...	...	...	...	...	49	...	49	16,664	
6	23	20	17	...	...	...	...	...	...	...	49	...	49	16,615	
7	60	20	45	...	...	...	...	...	...	...	49	...	49	16,561	
8	65	20	49	...	...	...	...	...	...	...	51	...	51	16,507	
9	65	20	49	...	...	...	...	...	...	...	68	...	68	16,439	
10	25	20	19	...	...	...	...	...	...	...	80	...	80	16,359	
11	26	20	20	...	...	...	...	...	...	...	80	...	80	16,279	
12	26	...	20	...	...	...	...	...	...	...	80	...	80	16,199	
13	3	...	2	...	...	...	...	...	...	...	80	...	80	16,199	
14	3	...	2	...	...	...	...	...	...	...	80	...	80	16,039	
15	3	...	2	...	...	...	...	...	...	...	80	...	80	15,959	
	419	274	...	...	...	...	...	...	...	...	...	...	..	...	
16	3	...	2	...	...	...	...	...	...	...	80	...	80	15,879	
17	3	...	2	...	...	...	...	...	...	...	80	...	80	15,799	
18	3	...	2	...	...	...	...	...	...	...	80	...	80	15,719	
19	...	...	...	...	...	...	...	...	...	...	80	...	80	15,639	
20	8	.	6	...	...	...	...	...	...	...	85	...	85	15,551	
21	8	...	6	...	...	...	...	...	...	...	85	...	85	15,469	
22	8	...	6	...	...	...	...	...	...	...	86	...	86	15,383	
23	8	...	6	...	...	...	...	...	...	...	96	...	96	15,287	
24	8	...	6	...	...	...	...	...	...	...	92	...	92	15,195	
25	8	...	6	...	...	...	...	...	...	...	80	...	80	15,115	
26	8	...	6	..	...	...	...	...	...	...	80	...	80	15,035	
27	8	...	6	...	...	...	...	..	...	...	80	...	80	14,955	
28	...	...	...	...	...	...	...	...	...	...	80	...	80	14,875	
	73	...	...	...	...	...	...	...	...	...	...	...	...	...	

LIMIT 2,300 M. C. FT. MADRAS TABLE N. IMPROVED—*contd.* 1905-06.

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (⅓ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+⅓ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, 4 of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
March 1906.															
1	8	...	...	...	...	...	...	...	...	...	80	...	80	14,795	
2	8	...	...	...	...	...	...	...	...	...	85	...	85	14,710	
3	8	...	...	...	...	...	...	...	...	...	84	...	84	14,626	
4	7	...	...	...	...	...	...	...	...	...	88	...	88	14,538	
5	7	...	...	...	...	...	...	...	...	...	92	...	92	14,446	
6	7	...	...	...	...	...	...	...	...	...	97	...	97	14,349	
7	8	...	...	...	...	...	...	...	...	...	88	...	88	14,261	
8	10	...	...	...	...	...	...	...	...	...	88	...	88	14,173	
9	10	...	...	...	...	...	...	...	...	...	94	...	94	14,079	
10	9	...	...	...	...	...	...	...	...	...	100	...	100	13,979	
11	9	...	...	...	...	...	...	...	...	...	104	...	104	13,875	
12	9	...	...	...	...	...	...	...	...	...	105	...	105	13,770	
13	9	...	...	...	...	...	...	...	...	...	114	...	114	13,656	
14	9	...	...	...	...	...	...	...	...	...	114	...	114	13,542	
15	9	...	...	...	...	...	...	...	...	...	114	...	114	13,428	
	127	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	9	...	...	...	...	...	...	...	...	...	102	...	102	13,326	
17	9	...	...	...	...	...	...	...	...	...	101	...	101	13,222	
18	9	...	...	...	...	...	...	...	...	...	105	...	105	13,117	
19	9	...	...	...	...	...	...	...	...	...	106	...	106	13,011	
20	5	...	...	...	...	...	...	...	...	...	106	...	106	12,905	
21	18	...	...	...	...	...	...	...	...	...	108	...	108	12,797	
22	18	...	...	...	...	...	...	...	...	...	110	...	110	12,687	
23	17	...	...	...	...	...	...	...	...	...	110	...	110	12,577	
24	17	...	...	...	...	...	...	...	...	...	112	...	112	12,465	
25	6	...	...	...	...	...	...	...	...	...	110	...	110	12,355	
26	9	...	...	...	...	...	...	...	...	...	110	...	110	12,245	
27	8	...	...	...	...	...	...	...	...	...	112	...	112	12,133	
28	7	...	...	...	...	...	...	...	...	...	112	...	112	12,021	
29	6	...	...	...	...	...	...	...	...	...	113	...	113	11,908	
30	8	...	...	...	...	...	...	...	...	...	114	...	114	11,794	
31	5	...	...	...	...	...	...	...	...	...	114	...	114	11,680	
	160	...	...	...	...	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (2 of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+⅔ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ⅓ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
														11,680	
1	5	...	...	...	...	...	...	...	...	...	116	...	116	11,564	
2	5	...	...	...	...	...	...	...	...	...	117	...	117	11,447	
3	5	...	...	...	...	...	...	...	...	...	117	...	117	11,330	
4	5	...	...	...	...	...	...	...	...	...	117	...	117	11,213	
5	5	...	...	...	...	...	...	...	...	...	117	...	117	11,096	
6	5	...	...	...	...	...	...	...	...	...	118	...	118	10,978	
7	5	...	...	...	...	...	...	..	...	...	118	...	118	10,860	
8	5	...	...	...	...	...	...	...	...	...	120	...	120	10,740	
9	5	...	...	...	...	...	...	...	...	...	120	...	120	10,620	
10	5	...	...	...	...	...	...	...	...	...	116	...	116	10,504	
11	5	...	...	...	...	...	...	...	...	...	118	...	118	10,386	
12	5	...	...	...	...	...	...	...	...	...	118	...	118	10,268	
13	36	...	...	...	...	...	...	...	...	...	120	...	120	10,148	
14	35	...	...	...	...	...	...	...	...	...	120	...	120	10,028	
15	21	..	...	...	...	...	...	...	...	...	121	...	121	9,907	
April 1906.	152	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	23	...	...	...	...	...	...	...	...	...	124	...	124	9,783	
17	8	...	...	...	...	...	...	...	...	...	124	...	124	9,659	
18	5	...	...	...	...	...	...	..	...	...	122	...	122	9,537	
19	8	...	...	...	...	...	...	...	...	...	121	...	121	9,416	
20	8	...	...	...	...	...	...	...	...	...	121	...	121	9,295	
21	8	...	...	...	...	...	...	...	...	...	121	...	121	9,174	
22	8	...	...	...	...	...	...	...	...	...	120	...	120	9,054	
23	8	...	...	...	...	...	...	...	...	...	120	...	120	8,934	
24	8	...	...	...	...	...	...	...	...	...	120	...	120	8,814	
25	8	...	...	...	...	...	...	...	...	...	121	...	121	8,693	
26	8	...	...	...	...	...	...	...	...	...	121	...	121	8,572	
27	8	...	...	...	...	...	...	...	...	...	121	...	121	8,451	
28	...	...	...	...	...	...	...	...	...	...	121	...	121	8,330	
29	...	...	...	...	...	...	...	...	...	...	121	...	121	8,209	
30	...	...	...	...	...	...	...	...	...	...	121	...	121	8,088	
	108	...	...	...	...	...	...	...	...	...	...	...	...	...	

Month and date		Conditions at Cauvery Dam								Conditions at Kannambadi						Remarks
		Flow at Kannambadi in m. c. ft. corresponding to date in col. 1.	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days presence	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
May 1906.	1	...	...	...	...	...	...	...	...	...	...	121	...	121	7,967	
	2	...	...	...	...	...	...	...	...	...	...	122	...	122	7,845	
	3	...	...	...	...	...	...	...	...	...	...	122	...	122	7,723	
	4	...	...	...	...	...	...	...	...	...	...	122	...	122	7,501	
	5	...	...	...	...	...	...	...	...	...	...	122	...	122	7,479	
	6	...	...	...	...	...	...	...	...	...	...	122	...	122	7,357	
	7	...	...	...	...	...	...	...	...	...	...	122	...	122	7,235	
	8	...	...	...	...	...	...	...	...	...	...	122	...	122	7,113	
	9	...	...	...	...	...	...	...	...	...	...	122	...	122	6,991	
	10	...	...	...	...	...	...	...	...	...	...	122	...	122	6,869	
	11	...	...	...	...	...	...	...	...	...	...	122	...	122	6,747	
	12	...	...	...	...	...	...	...	...	...	...	121	...	121	6,626	
	13	...	...	...	...	...	...	...	...	...	...	118	...	118	6,508	
	14	...	...	...	...	...	...	...	...	...	...	105	...	105	6,403	
	15	...	...	...	...	...	...	...	...	...	...	89	...	89	6,314	
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	16	...	...	...	...	...	...	...	...	...	...	49	...	49	6,265	
	17	...	...	...	...	...	...	...	...	...	...	49	...	49	6,216	
	18	...	...	...	...	...	...	...	...	...	...	49	...	49	6,167	
	19	8	...	...	...	...	...	...	...	...	...	61	...	61	6,106	
	20	8	...	...	...	...	...	...	...	...	...	61	...	61	6,045	
	21	8	...	...	...	...	...	...	...	...	...	77	...	77	5,968	
	22	8	...	...	...	...	...	...	...	...	...	49	...	49	5,919	
	23	8	...	...	...	...	...	...	...	...	...	61	...	61	5,858	
	24	7	...	...	...	...	...	...	...	...	...	77	...	77	5,781	
	25	7	...	...	...	...	...	...	...	...	...	78	...	78	5,703	
	26	7	...	...	...	...	...	...	...	...	...	78	...	78	5,625	
	27	7	...	...	...	...	...	...	...	...	...	78	...	78	5,547	
	28	5	...	...	...	...	...	...	...	...	...	85	...	85	5,462	
	29	5	32	...	...	...	...	...	...	...	...	88	...	88	5,374	
	30	5	32	...	...	...	...	...	...	...	...	88	...	88	5,286	
	31	5	32	...	...	...	...	...	...	...	...	93	...	93	5,193	
		88	96	...	...	...	...	...	...	...	...	...	...	...	...	

Month and date	Conditions at Cauvery Dam: Flow at Kannambadi in m. c. ft., corresponding to date in col. 1	Flow at Cauvery Dam in m. c. ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4) + ¾ of surplus in col. 13	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5 + col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Conditions at Kannambadi: Gross storage at Kannambadi col. 2 + previous day's balance in col. 15	Compensation water converted to Kannambadi *i.e.*, ¾ of col. 6	Draw-off for Irrigation, etc.	Surplus when Reservoir is full	Total of cols. 11, 12 and 13	Balance in Reservoir	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
June 1906. 1	6	32	...	...	...	...	...	...	...	...	100	...	100	5,093	
2	6	44	...	...	...	...	...	...	...	...	100	...	100	4,993	
3	5	44	...	...	...	...	...	...	...	...	100	...	100	4,893	
4	6	44	...	...	...	...	...	...	...	...	90	...	90	4,803	
5	6	38	...	...	...	...	...	...	...	...	92	...	92	4,711	
6	6	130	...	...	...	...	...	...	...	...	87	...	87	4,624	
7	48	50	...	...	...	...	...	...	...	...	87	...	87	4,537	
8	89	50	...	...	...	...	...	...	...	...	94	...	94	4,443	
9	...	44	...	...	...	...	...	...	...	...	101	...	101	4,342	
10	...	38	...	...	...	...	...	...	...	...	105	...	105	4,237	
11	...	38	...	...	...	...	...	...	...	...	109	...	109	4,128	
12	...	44	...	...	...	...	...	...	...	...	111	...	111	4,017	
13	...	50	...	...	...	...	...	...	...	...	111	...	111	3,906	
14	...	98	...	...	...	...	...	...	...	...	115	...	115	3,791	
15	...	200	...	...	...	...	...	...	...	...	118	...	118	3,673	
	172	944	...	...	...	...	...	...	...	...	...	...	...	...	
16	1	158	...	...	...	...	...	...	...	...	75	...	75	3,598	
17	5	130	...	...	...	...	...	...	...	...	77	...	77	3,521	
18	4	98	...	...	...	...	...	...	...	...	77	...	77	3,444	
19	4	66	...	...	...	...	...	...	...	...	79	...	79	3,365	
20	486	44	...	...	...	...	...	...	...	...	78	...	78	3,287	
21	853	66	...	...	...	...	...	...	...	...	78	...	78	3,209	
22	3,208	354	...	...	...	...	...	...	...	...	78	...	78	3,131	
23	2,974	386	...	...	...	...	...	...	...	...	6	...	6	3,125	
24	1,708	338	...	...	...	...	...	...	...	...	6	...	6	3,119	
25	533	1,314	...	...	...	...	...	...	...	...	6	...	6	3,113	
26	477	803	...	...	...	...	...	...	...	...	6	...	6	3,107	
27	459	628	...	...	...	...	...	...	...	...	6	...	6	3,101	
28	316	494	...	...	...	...	...	...	...	...	6	...	6	3,095	
29	209	402	...	...	...	...	...	...	...	...	6	...	6	3,089	
30	165	354	...	...	...	...	...	...	...	...	6	...	6	3,083	
	11,402	5,635	...	...	...	...	...	...	...	...	...	...	...	...	

IRRI. PAPERS

Month and date	Conditions at the Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m. c.ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c.ft. 3 days later	Value of Kannambadi flow first impounded Cauvery Dam (4 of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4) +⅓ of surplus in col. 13, if any	Compensation water due to excess storage col. 3, if less or limit —col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi, col. 2+previous days' balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ⅓ of col. 6	Draw-off for irrigation, etc.	Surplus when reservoir is full	Total of cols. 11, 12 and 13	Balance in reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
									10,000					10,000	
1	157	539	118	421	118	...	...	...	10,157	...	43	...	43	10,114	
2	110	618	83	535	83	...	...	...	10,224	...	43	...	43	10,181	
3	124	286	93	193	93	...	...	...	10,305	...	43	...	43	10,262	
4	118	172	89	83	89	201	...	...	10,380	157	43	...	200	10,180	
5	132	517	99	418	99	501	...	...	10,312	110	43	...	153	10,159	
6	146	786	110	676	110	769	...	...	10,305	124	43	...	167	10,138	
7	120	561	90	471	90	560	...	...	10,258	118	43	...	161	10.097	
8	97	539	73	466	73	565	...	...	10,194	132	43	...	175	10,019	
9	286	435	215	220	215	330	...	...	10,305	146	43	...	189	10,116	
10	720	371	540	—169*	540	250	...	...	10,836	120	43	...	163	10,673	
11	702	419	527	—108*	527	181	...	...	11,375	97	43	...	140	11,235	
12	688	1,123	516	607	516	822	...	...	11,923	286	43	...	329	11,594	
13	1,163	1,629	872	757	872	1,297	...	...	12,757	720	43	...	763	11,994	
14	1,438	3.333	1,079	2,254	46	2,781	481	481	13,432	702	43	...	745	12,687	
15	1,100	3,459	825	2,634	...	3,150	850	516	13,787	681	43	...	731	13,056	
	7,101	14,787	...	...	2,671	...	1,331	1,007	...	3;400	...	...	4,045	...	
16	712	2,791	534	2,257	43	3,129	829	43	13,768	1,163	152	...	1,315	12,453	
17	578	1,973	434	1,539	434	1,585	...	...	13,031	61	152	...	213	12,818	
18	471	786	353	433	353	433	...	...	13,289	...	152	...	152	13,137	
19	330	698	248	450	248	493	...	...	13,467	57	152	...	209	13,258	
20	315	595	236	359	236	793	...	...	13,573	578	152	—	730	12,843	
21	262	495	194	301	194	654	...	...	13,105	471	152	...	623	12,482	
22	214	435	161	274	161	522	...	...	12,696	330	152	...	482	12,214	
23	122	387	92	295	92	531	...	...	12,336	315	152	...	467	11,869	
24	100	355	75	280	75	474	...	...	11,969	262	152	...	414	11,555	
25	128	323	96	227	96	388	...	...	11,683	214	152	...	366	11,317	
26	303	307	227	80	227	172	...	...	11,620	122	152	...	274	11,043	
27	248	307	186	121	186	196	...	...	11,291	100	152	...	252	11,039	
28	472	273	354	— 81*	273	15	...	...	11,511	118	152	...	280	11,231	
29	996	355	747	—392*	355	—165	...	...	12,227	303	152	...	455	11,772	
30	569	355	427	— 72*	355	114	...	...	12,341	248	152	...	400	11,941	
	5,820	...	...	...	3,328	...	829	43	...	4,352	...	...	...	...	
	12,921	...	...	...	5,999	...	2,160	1,050	...	7,752	...	...	...	...	

June 1913.

* When net flow in col. (5) is negative, compensation is given for the actual discharge in col. (3).

Month and date		Conditions at the Cauvery Dam: Flow at Kannambadi in m. c.ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c.ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+3 of surplus in col. 13, if any	Compensation water due to excess storage col. 3, if less or limit —col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Conditions at Kannambadi: Gross storage at Kannambadi, col. 2+previous days' balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for irrigation, etc.	Surplus when reservoir is full	Total of cols. 11, 12 and 13	Balance in reservoir	Remarks
1		2	3	4	5	6	7	8		10	11	12	13	14	15	16
July 1913.	1	494	1,243	370	873	370	...	...	..	12,435	364	156	...	520	11,915	
	2	387	1,629	290	1,339	290	...	...	...	12,302	473	156	...	629	11,673	
	3	444	1,325	333	992	333	...	...	...	12,117	473	156	...	629	11,488	
	4	425	1,563	319	1,244	319	1,614	...	...	11,913	494	156	...	650	11,263	
	5	500	1,002	376	626	376	916	...	...	11,764	387	156	...	543	11,221	
	6	757	732	568	164	568	497	...	...	11,978	444	156	...	600	11,378	
	7	627	840	469	371	469	690	...	...	12,005	425	156	...	581	11,424	
	8	576	948	432	516	432	892	...	...	12,000	501	156	...	657	11,343	
	9	498	786	373	413	373	981	...	...	11,841	757	156	...	913	10,928	
	10	530	698	398	300	398	769	...	...	11,458	627	156	...	783	10,675	
	11	636	663	477	186	477	618	...	...	11,311	576	156	...	732	10,579	
	12	674	840	506	334	506	707	...	...	11,253	498	156	...	654	10,599	
	13	586	732	439	294	439	691	...	...	11,185	530	156	...	686	10,449	
	14	584	698	438	260	438	737	...	...	11,083	636	156	...	792	10,291	
	15	541	948	406	542	406	1,048	...	...	10,832	674	156	...	830	10,002	
		8,259	...	...	...	6,194	...	...	...	...	7,859	...	...	...	...	
	16	1,616	4,824	1,212	3,612	...	4,051	1,715	439	11,618	586	156	...	742	10,876	
	17	5,267	14,027	3,950	10,077	...	10,515	8,215	438	16,143	584	156	...	740	15,403	
	18	8,262	12,038	6,197	5,841	...	6,247	3,947	406	23,665	541	156	...	697	22,968	
	19	8,345	11,282	6,259	5,023	...	5,023	2,723	...	31,313	...	156	...	156	31,157	
	20	7,623	10,347	5,717	5,815	...	5,815	3,515	...	38,780	...	156	1,544	1,700	37,080	
	21	5,672	7,009	4,254	6,892	...	6,892	4,592	...	42,752	...	156	5,516	5,672	37,080	
	22	3,166	4,979	2,374	4,863	...	4,863	2,963	...	40,246	...	156	3,010	3,166	37,080	
	23	1,944	3,734	1,458	3,617	...	3,617	1,317	...	39,024	...	156	1,788	1,944	37,080	
	24	1,590	3,010	1,192	2,894	...	2,394	594	...	38,670	...	156	1,434	1,590	37,080	
	25	1,275	2,165	956	2,048	117	2.048	...	...	35,805	...	156	1,119	1,275	37,080	
	26	1,372	1,889	1,029	1,772	117	1,772	...	...	38,452	...	156	1,216	1,372	37,080	
	27	1,467	2,095	1,100	1,978	117	1,978	...	...	38,547	...	156	1,311	1,467	37,080	
	28	1,453	2,095	1 090	1,861	234	1,978	...	...	38,533	156	156	1,141	1,453	37,080	
	29	1,615	2,235	1,211	2,001	234	2,118	...	...	38.695	156	156	1,303	1,615	37,080	
	30	3,225	6,132	2,419	5,898	...	6,015	3,715	117	40,305	156	156	2,913	3,225	37,080	
	31	4,396	7,167	3,297	6,741	...	6,975	4,675	234	41,476	312	156	3,828	4,396	37,080	
		58,288	...	...	...	819	...	37,571	1,634	...	2,491	...	26,123	...	...	
		66,547	...	...	...	7,013	...	37,571	1,634	...	10,350	...	26,123	...	...	

Month and date		Conditions of the Cauvery Dam								Conditions at Kannambadi						Remarks
		Flow at Kannambadi in m. c.ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c.ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13, if any	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5+col. 6, three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi, col. 2+previous days' balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for irrigation, etc.	Surplus when reservoir is full	Total of cols. 11, 12 and 13	Balance in reservoir	
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
August 1913.	1	4,786	7,287	3,589	6,917	..	7,151	4,851	234	41,866	...	156	4,318	4,786	37,080	
	2	4,981	7,167	3,736	6,668	...	6,618	4,318	...	42,061	...	156	4,825	4,981	37,080	
	3	5,125	5,663	3,844	5,546	...	5,546	3,246	...	42,205	...	156	4,969	5,125	37,080	
	4	4,472	5,883	3,354	5,766	...	5,766	3,466	...	41,552	...	156	4,316	4,472	37,080	
	5	4,235	4,877	3,175	4,755	...	4,755	2,455	...	41,315	...	156	4,079	4,235	37,080	
	6	3,106	3,884	2,329	3,768	...	3,768	1,468	...	40,186	...	156	2,950	3,106	37,080	
	7	2,817	4,012	2,113	3,895	...	3,895	1,595	...	39,897	...	156	2,661	2,817	37,080	
	8	2,057	3,526	1,543	3,409	...	3,409	1,109	...	39,137	...	156	1,901	2,057	37,080	
	9	1,997	2,656	1,498	2,539	...	2,539	239	...	39,077	...	156	1,841	1,997	37,080	
	10	1,691	2,375	1,268	2,258	42	2,258	...	...	38,771	...	156	1,535	1,691	37,080	
	11	1,331	2,095	998	1,978	117	1,978	...	...	38,411	...	156	1,175	1,331	37,080	
	12	1,212	1,824	909	1,707	117	1,707	...	...	38,292	...	156	1,056	1,212	37,080	
	13	1,036	1,629	777	1,470	159	1,512	...	...	38,116	56	156	824	1,036	37,080	
	14	814	1,429	610	1,196	233	1,313	...	...	37,894	156	156	502	814	37,080	
	15	744	1,243	558	1,009	234	1,126	...	...	37,824	156	156	432	744	37,080	
		40,404	...	...	...	902	...	22,747	234	...	368	...	37,384	...	...	
	16	701	1,183	528	907	276	1,066	...	...	37,784	212	156	336	704	37,080	
	17	643	1,123	482	773	350	1,006	...	...	37,723	311	156	176	643	37,080	
	18	599	1,002	449	651	351	885	...	...	37,679	312	156	131	599	37,080	
	19	674	894	506	501	393	777	...	...	37,754	368	156	150	674	37,080	
	20	618	894	464	430	464	780	...	...	37,698	467	156	...	623	37,075	
	21	675	840	506	334	471	720	...	...	37,750	468	156	46	670	37,080	
	22	670	1,002	503	499	503	892	...	...	37,750	524	156	...	680	37,070	
	23	992	1,063	744	504	559	968	...	...	38,062	580	156	216	982	37,080	
	24	1,216	1,563	912	1,004	559	1,475	...	...	38,296	589	156	471	1,216	37,080	
	25	1,133	1,563	850	943	620	1,446	...	...	38,213	671	156	306	1,133	37,080	
	26	1,307	1,325	980	650	675	1,209	...	...	38,387	745	156	406	1,307	37,080	
	27	1,140	1,629	855	953	676	1,512	...	...	38,220	745	156	239	1,140	37,080	
	28	892	1,429	669	760	669	1,380	...	...	37,972	775	156	...	931	37,041	
	29	802	1,123	602	521	602	1,196	...	...	37,843	900	156	...	1,056	36,787	
	30	934	1,002	700	302	700	978	...	...	37,721	901	156	...	1,057	36,664	
	31	809	1,123	607	516	607	1,185	...	...	37,473	892	156	...	1,048	36,425	
		13,808	...	...	...	8,175	...	...	...	...	9,460	...	2,507	...	...	
		54,212	...	...	...	9,377	...	22,747	234	...	9,828	...	39,891	...	...	

Month and date		Conditions at the Cauvery Dam								Conditions at Kannambadi						Remarks
		Flow at Kannambadi in m. c. ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c.ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (3 of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+3 of surp us in col. 13, if any	Compensation water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi, col. 2+previous days' balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, 4 of col. 6	Draw-off for irrigation, etc.	Surplus when reservoir is full	Total of cols. 11, 12 and 13	Balance in reservoir	
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
September 1913.	1	758	1,002	569	433	569	1,035	...	...	37,183	803	156	...	959	36,224	
	2	874	894	656	238	656	938	...	...	37,098	933	156	...	1,089	36,009	
	3	946	1,123	710	413	710	1,020	...	...	36,955	809	156	...	965	35,990	
	4	910	1,429	683	746	683	1,314	...	...	36,900	758	156	...	914	35,986	
	5	863	1,303	647	656	647	1,312	...	...	36,849	875	156	...	1,031	35,818	
	6	785	1,063	589	474	589	1,184	...	...	36,603	947	156	...	1,103	35,500	
	7	687	948	515	433	515	1,116	...	...	36,187	910	156	...	1,066	35,121	
	8	671	840	503	337	503	984	...	...	35,792	863	156	...	1,019	34,773	
	9	500	664	375	289	375	878	...	...	35,273	785	156	...	941	34,322	
	10	448	629	336	293	336	808	...	...	34,780	687	156	...	843	33,937	
	11	394	562	296	266	296	769	...	...	34,331	671	156	...	827	33,504	
	12	357	518	268	250	268	625	...	...	33,861	500	156	...	656	33,205	
	13	293	473	220	253	220	589	...	...	33,498	448	156	...	604	32,894	
	14	222	451	167	284	167	580	...	...	33,116	394	156	...	550	32,566	
	15	296	419	222	197	222	465	...	...	32,862	357	156	...	513	32,349	
		9,004	...	...	...	6,756	...	...	...	...	10,740	...	...	...	...	
	16	268	419	201	218	201	438	...	..	32,617	293	156	...	449	32,168	
	17	253	419	190	229	190	396	...	...	32,421	222	156	...	378	32,043	
	18	255	451	191	260	191	482	...	...	32,298	296	156	...	452	31,846	
	19	255	451	191	260	191	461	...	...	32,101	268	156	...	424	31,677	
	20	287	1,498	215	1,283	215	1,473	...	..	31,964	253	156	...	409	31,555	
	21	320	1,183	240	943	240	1,134	...	...	31,875	255	156	...	411	31,464	
	22	316	732	237	495	237	686	...	...	31,780	255	156	...	411	31,369	
	23	318	1,063	239	824	239	1,039	...	...	31,687	287	156	...	443	31,244	
	24	284	1,243	213	1,030	213	1,270	...	...	31,528	320	156	...	476	31,052	
	25	446	1,325	335	990	335	1,227	...	...	31,498	316	156	...	472	31,026	
	26	415	4,796	311	4,485	...	4,724	2,424	239	31,441	318	156	...	474	30,967	
	27	571	2,759	428	2,331	...	2,544	244	213	31,538	284	156	...	440	31,098	
	28	361	1,824	271	1,553	271	1,888	...	...	31,459	446	156	...	602	30,857	
	29	600	1,954	450	1,504	450	1,504	...	...	31,457	...	156	...	156	31,301	
	30	675	2,408	506	1,902	398	1,902	...	...	31,976	...	156	...	156	31,820	
		5,624	...	...	...	3,371	...	2,668	452	...	3,813	...	...	...	...	
		14,628	...	...	...	10,127	...	2,668	452	...	14,553	...	...	...	...	

Month and date	Conditions at the Cauvery Dam								Conditions at Kannambadi						Remarks
	Flow at Kannambadi in m.c.ft. corresponding to date in col. 1	Flow at Cauvery Dam in m. c.ft. 3 days later	Value of Kannambadi flow first impounded at Cauvery Dam (¾ of col. 2)	Net flow at Cauvery Dam (col. 3—col. 4)+¾ of surplus in col. 13, if any	Compensation Water due to excess storage col. 3, if less or limit—col. 5	Resulting flow at Cauvery Dam col. 5+col. 6; three days previous	Quantity running to waste above limit	Quantity running to waste out of compensation water	Gross storage at Kannambadi, col. 2+previous day's balance in col. 15	Compensation water converted to Kannambadi, *i.e.*, ¾ of col. 6	Draw-off for irrigation, etc.	Surplus when reservoir is full	Total of cols. 11, 12 and 13	Balance in reservoir	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
														31,820	
1	638	2,504	479	2,025	275	2,296	...	...	32,458	361	156	...	517	31,941	
2	673	2,923	505	2,418	...	2,868	568	450	32,614	600	156	...	756	31,858	
3	634	3,901	476	3,425	...	3,823	1,523	398	32,492	531	156	...	687	31,805	
4	714	2,432	536	1,896	404	2,171	...	...	32,519	367	156	...	523	31,996	
5	704	3,368	528	2,840	...	2,840	540	...	32,700	...	156	...	156	32,544	
6	632	2,483	474	2,009	291	2,009	...	...	33,176	...	156	...	156	33,020	
7	845	2,305	634	1,671	629	2,075	..	...	33,865	539	156	...	695	33,170	
8	979	2,746	734	2,012	288	2,012	...	...	34,149	...	156	...	156	33,993	
9	804	2,165	603	1,562	603	1,853	...	...	34,797	388	156	...	544	34,253	
10	692	1,967	519	1,452	519	2,081	...	...	34,945	839	156	...	995	33,950	
11	503	1,303	377	926	377	1,214	...	...	34,453	384	156	...	540	33,913	
12	529	1,629	397	1,232	397	1,835	...	...	34,442	804	156	...	960	33,482	
13	1,107	4,193	830	3,363	...	3,882	1,582	519	34,589	692	156	...	848	33,741	
14	3,220	6,396	2,415	3,981	...	4,358	2,058	377	36,961	503	156	...	659	36,302	
15	3,373	5,615	2,530	4,517	...	4,914	2,614	397	39,675	529	156	1,910	2,595	37,080	
	...	...	...	...	...	...	8,885	1,293	...	...	...	1,910	...	...	
16	2,301	4,555	1,726	4,438	...	4,438	2,138	...	39,381	...	156	2,145	2,301	37,080	
17	1,299	3,332	974	3,215	...	3,215	915	...	38,379	...	156	1,143	1,299	37,080	
18	1,005	2,095	754	1,978	117	1,978	...	...	38,085	...	156	849	1,005	37,080	
19	775	1,694	581	1,577	117	1,577	...	...	37,855	..	156	619	775	37,080	
20	620	1,429	465	1,312	117	1,312	...	...	37,700	...	156	464	620	37,080	
21	...	...	..	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	..	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	..	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	..	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	..	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	3,053	...	...	...	...	5,220	...	...	
	...	...	...	...	...	...	11,938	1,293	...	...	...	7,130	...	...	

October 1913.

APPENDIX P.

WORKING TABLES.

Explanations of the columns of the working tables.

TABLE I.

Column 1.—Month and date.

Column 2.—Discharges at Kannambadi in m.c.ft. corresponding to date in column 1.

Column 3.—Gives excess over N × limit of flow at Cauvery Dam or quantity permissible for storage at Kannambadi. N being $\frac{5}{8}$ths during months of June to September and $\frac{1}{3}$rd during October to January.

Column 4.—Equivalent of column 3 at the Cauvery Dam allowing for transmission losses, *i.e.*, $\frac{3}{4}$ths of column 3.

Column 5.—Discharges in m.c.ft. at Cauvery Dam corresponding to 3 days later than the date in column 1.

Column 6.—Discharges at Cauvery Dam as affected after storage at Kannambadi. Column 5—column 4.

Column 7.—Quantity in excess of the limit flow required at the Cauvery Dam running to waste even after the impounding at the Kannambadi Reservoir.

Column 8.—Deficit in Madras supplies due to the impounding at the Kannambadi Reservoir.

TABLE II.

Column 1.—Month and date.

Column 2.—Discharges at Cauvery Dam in m.c.ft. corresponding to 3 days later than the date in column 1.

Column 3.—Gives quantity in excess of the limit of flow at Cauvery Dam.

Column 4.—Gives quantity in column 3 as it would be at the Kannambadi Reservoir site after adding for the transmission losses at 75 m.c.ft. at the Cauvery Dam representing 100 at the Kannambadi site.

Column 5.—Discharges at Kannambadi Dam in m.c.ft., corresponding to date in column 1.

Column 6.—Quantity available for storage at Kannambadi, column 5 or column 4 whichever is less.

Column 7.—Gives equivalent of column 6 at Cauvery Dam, *i.e.*, $\frac{3}{4}$ × column 6.

Column 8.—Gives the discharges at Cauvery Dam in m.c.ft., as affected after storage at Kannambadi.

Column 9.—Gives quantity running to waste at Cauvery Dam after storage at Kannambadi.

TABLE III.

Column 1.—Month and date.

Column 2.—Approximations for finding out the quantity that could be impounded at Kannambadi Dam as detailed below:—

2 (*a*) Flow at Kannambadi in m.c.ft., corresponding to the date in column 1 as gauged at the three higher anicuts on the three rivers, Cauvery, Hemavati and Lakshmantirtha.

2 (*b*) Gives the probable flow at Cauvery Dam on the assumption that during the months of June to September, the flow at Kannambadi is $\frac{5}{8}$ths of the flow at the Cauvery Dam; this figure $\frac{5}{8}$ths being derived by comparing the flow at the two places during the above months in the five worst years on record.

During the months of October to January the proportion is $\frac{1}{3}$rd computed as above for the worst five years for those months.

2 (*c*) Gives the probable excess over the limit of flow required at the Cauvery Dam, *i.e.*, column 2 (*b*)—limit in column 16.

2 (*d*) Gives the value of the quantity in column 2 (*c*) converted to Kannambadi Dam, on the assumption that the transmission losses from Kannambadi to Cauvery Dam amount to 25% on the Kannambadi flow. This gives the permissible quantity for storage at Kannambadi.

2 (*e*) Gives the quantity that could be impounded at Kannambadi; column 2 (*d*) or 2 (*a*) whichever is less.

(*Columns 3 to 9 show the conditions at the Cauvery Dam.*)

Column 3.—Flow at Cauvery Dam in m.c.ft., three days later than the date in column 1.

Column 4.—Value of column 2 (*e*), (*i.e.*, the quantity that could be impounded, at Kannambadi, converted to what it would be at the Cauvery Dam, *i.e.*, $\frac{3}{4}$ × column 2 (*e*).

Column 5.—Net flow at Cauvery Dam before compensation water reaches, *i.e.*, column 3—column 4 plus $\frac{3}{4}$ of surplus (at Kannambadi, if any).

Column 6.—Gives compensation water called at the Cauvery Dam. Column 3, if less than limit or limit—column 5.

Column 7.—Resulting flow at Cauvery Dam after compensation water reaches. Column 5 plus column 6, 3 days previous.

Column 8.—Quantity running to waste above the required limit in column 16, at the Cauvery Dam after the Kannambadi Dam begins to operate.

Column 9.—Gives quantity running to waste out of the compensation water.

(*Columns 10 to 15 show conditions at Kannambadi Dam*).

Column 10.—Gives gross storage in the reservoir. Column 2 (*e*) plus previous day's balance in reservoir in column 15.

Column 11.—Gives quantity of compensation water called at Cauvery Dam converted to what it would be at the Kannambadi Dam, *i.e.*, $\frac{4}{3}$ × column 6.

Column 12.—Gives quantity of draw-off for irrigation, etc., from the reservoir.

43 m.c.ft., daily for summer irrigation from 16th January to 15th June, plus whatever is required for Power based on Sivasamudram discharges.

152 m.c.ft., daily for full irrigation and evaporation during second half of June.

156 m.c.ft., daily for full irrigation and evaporation from 1st July to 15th January.

Column 13.—Gives the quantity of surplus at Kannambadi Dam when reservoir is full.

Column 14.—Gives totals of columns 11, 12 and 13. Total expenditure from the storage water.

Column 15.—Gives daily balance in reservoir. Column 10—column 14.

Column 16.—Gives limits of flow at Cauvery Dam as per proposed rules.

LIMIT OF RULES. TABLE I. 1905-06.

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ⅔ × col. 9 from June to Sept. and ⅓ × col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. ¾ of col. 3	Discharges at Cauvery Dam	Cauvery Dam as affected.	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limits of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
June 1905.	1	...	...	...	322	322	...	...	
	2	...	...	...	272	272	...	...	
	3	...	...	...	272	272	...	...	
	4	...	...	...	218	218	...	...	
	5	...	...	...	370	370	...	...	
	6	...	...	...	322	322	...	...	
	7	...	...	...	290	290	...	...	450
	8	1	...	...	236	236	...	...	
	9	1	...	...	236	236	...	...	
	10	1	...	...	200	200	...	...	
	11	1	...	...	218	218	...	...	
	12	95	...	...	254	254	...	...	
	13	641	360	270	200	—70*	...	200	
	14	151	...	...	158	158	...	...	
	15	33	...	...	130	130	...	...	
		663	360	270	...	...	...	200	
	16	132	...	...	186	186	...	...	
	17	132	...	...	186	186	...	...	
	18	138	...	...	158	158	...	...	
	19	160	...	...	130	6	...	588	
	20	1,447	784	588	594	88	...	450	
	21	1,263	600	450	538	538	...	...	
	22	210	...	...	1,818	1,818	...	...	1,060
	23	177	...	...	1,287	1,287	...	...	
	24	144	...	...	851	851	...	...	
	25	135	...	...	662	662	...	...	
	26	328	...	...	594	594	...	...	
	27	328	...	...	754	754	...	...	
	28	405	...	...	1,579	1,579	...	...	
	29	569	...	...	3,697	3,697	...	...	
	30	723	60	45	3,638	3,593	2,533	...	
		...	1,444	1,083	...	...	2,533	1,038	
		...	1,804	1,353	...	...	2,533	1,238	
July 1905.	1	1,141	125	94	3,802	3,708	2,083	...	
	2	1,172	156	117	3,680	3,563	1,938	...	
	3	1,044	28	21	2,834	2,813	1,188	...	1,625
	4	855	...	...	2,020	2,020	...	...	
	5	676	...	...	1,495	1,495	...	...	
	6	612	...	...	1,000	1,000	...	...	
	7	584	...	...	730	730	...	...	
	8	2,714	1,698	1,273	730	—543*	...	730	
	9	2,804	1,788	1,341	4,077	2,736	1,111	...	
	10	1,992	976	732	3,161	2,429	804	...	
	11	795	...	...	2,160	2,160	...	...	
	12	631	...	...	1,625	1,625	...	...	
	13	654	...	...	1,240	1,240	...	...	
	14	573	...	...	892	892	...	...	
	15	534	...	...	628	628	...	...	
		...	4,771	3,578	...	...	7,124	730	

* When column (6) is negative, natural flow is entered in deficit column (8).

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ⅔ × col. 9 from June to Sept. and ½ × col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. ¾ of col. 3	Discharges at Cauvery Dam	Cauvery Dam as affected	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
July 1905.	16	556	...	...	538	538	...	...	
	17	556	...	...	472	472	...	...	
	18	556	...	...	516	516	...	...	
	19	1,233	217	163	628	465	...	163	
	20	1,802	786	589	3,667	3,078	1,453	...	
	21	1,417	3,001	2,251	7,516	5,265	3,640	...	
	22	5,924	4,908	3,681	7,859	4,178	2,553	...	
	23	6,695	5,679	4,259	8,003	3,744	2,119	...	1,625
	24	6,005	4,989	3,742	6,516	2,774	1,149	...	
	25	3,606	2,590	1,942	4,664	2,722	1,097	...	
	26	2,770	1,754	1,315	4,585	3,270	1,645	...	
	27	2,486	1,470	1,102	4,133	3,031	1,406	...	
	28	2,173	1,157	868	4,133	3,265	1,640	...	
	29	2,029	1,013	760	3,046	2,286	661	...	
	30	1,958	942	706	2,698	1,992	367	...	
	31	1,821	805	604	2,650	2,046	421	...	
		...	29,311	...	...	...	18,151	163	
		...	34,082	...	...	...	25,275	893	
August 1905.	1	1,382	366	275	2,440	2,165	540	...	
	2	1,733	717	538	2,222	1,684	59	...	
	3	1,676	660	495	2,074	1,579	...	46	
	4	994	...	...	1,859	1,859	...	...	
	5	549	...	...	1,573	1,573	...	...	
	6	709	...	...	1,232	1,232	...	...	1,625
	7	666	...	...	981	981	...	...	
	8	592	...	..	803	803	...	...	
	9	595	...	...	662	662	...	...	
	10	561	...	...	594	594	...	...	
	11	561	...	...	560	560	...	...	
	12	658	...	...	538	538	...	...	
	13	545	...	...	516	516	...	...	
	14	379	...	...	594	594	...	...	
	15	565	...	...	784	784	...	...	
		...	1,743	1,308	...	...	607	46	
	16	556	...	...	628	628	...	...	
	17	731	...	...	538	538	...	...	
	18	731	...	...	576	576	...	...	
	19	731	...	...	696	696	...	...	
	20	689	...	...	851	851	...	...	
	21	763	...	...	1,116	1,116	...	...	
	22	1,134	118	88	1,116	1,028	...	88	1,625
	23	1,304	288	216	1,116	900	...	216	
	24	922	...	...	1,062	1,062	...	...	
	25	1,094	78	58	1,116	1,058	...	58	
	26	1,534	518	388	1,170	782	...	388	
	27	1,059	43	32	1,345	1,313	...	32	
	28	985	...	...	1,345	1,345	...	...	
	29	1,057	41	31	1,696	1,665	40	...	
	30	1,074	58	43	1,696	1,653	28	...	
	31	981	...	...	1,755	1,755	...	...	
		...	1,144	856	...	...	68	782	
		...	2,887	2,164	...	...	675	828	

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ⅘ × col. 9 from June to Sept. and ¾ × col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. ¾ of col. 3	Discharge at Cauvery Dam	Cauvery Dam as affected	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limits of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
September 1905.	1	879	...	...	1,755	1,755	...	...	
	2	782	...	...	1,170	1,170	...	...	
	3	750	...	...	851	851	...	...	
	4	847	...	...	892	892	...	...	
	5	584	...	...	838	838	...	...	
	6	869	...	...	784	784	...	...	
	7	1,163	147	110	838	728	...	110	1,625
	8	1,392	376	282	1,536	1,254	...	282	
	9	1,503	487	365	2,320	1,955	330	...	
	10	1,471	455	241	2,089	1,848	223	...	
	11	1,136	120	90	1,798	1,708	83	...	
	12	1,035	19	14	1,495	1,481	...	14	
	13	997	...	...	1,300	1,300	...	...	
	14	646	...	...	1,060	1,060	...	...	
	15	616	...	...	1,365	1,365	...	...	
		...	1,604	1,102	...	...	636	406	
	16	457	...	...	730	730	...	...	
	17	421	...	...	662	662	...	...	
	18	383	...	...	1,365	1,365	...	...	
	19	374	...	...	730	730	...	...	
	20	355	...	...	594	594	...	...	
	21	300	..	...	494	494	...	...	
	22	290	...	...	450	450	...	...	
	23	278	...	...	434	434	...	...	
	24	238	...	...	386	386	...	...	1,120
	25	238	...	...	354	354	...	...	
	26	267	...	...	338	338	...	...	
	27	268	...	...	338	838	...	...	
	28	217	...	...	338	338	...	...	
	29	206	...	...	338	338	...	...	
	30	145	...	...	322	322	...	...	
		...	...	...	..	...	...	...	
		...	1,604	1,102	...	...	636	406	
October 1905.	1	142	...	...	322	322	...	...	
	2	142	...	...	322	322	...	...	
	3	174	...	...	338	338	...	...	
	4	237	...	...	1,062	1,062	...	...	
	5	201	...	...	628	628	...	...	
	6	214	...	...	472	472	...	...	1,240
	7	237	...	...	851	851	...	...	
	8	196	...	...	3,336	3,336	...	...	
	9	181	...	...	2,346	2,346	...	...	
	10	159	...	...	3,140	3,140	...	...	
	11	258	...	...	2,198	2,198	...	...	
	12	595	182	136	2,192	2,056	816	...	
	13	914	501	376	4,892	4,516	3,276	...	
	14	1,245	832	624	3,879	3,255	2,015	...	
	15	2,761	2,348	1,761	3,870	2,109	869	...	
		...	3,863	2,897	...	...	6,976	...	

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ⅘ × col. 9 from June to Sept. and ½ × col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. ¾ of col. 3	Discharges at Cauvery Dam	Cauvery Dam as affected	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limits of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
October 1905.	16	1,415	1,002	751	4,190	3,439	2,199	...	
	17	912	499	374	3,001	2,627	1,387	...	
	18	726	313	235	2,305	2,070	830	...	
	19	559	146	109	2,353	2,244	1,004	...	
	20	760	347	260	1,048	788	...	260	
	21	493	80	60	1,000	940	...	60	
	22	414	1	1	838	837	...	1	1,240
	23	348	...	...	652	652	...	...	
	24	278	...	...	560	560	...	...	
	25	205	...	...	516	516	...	...	
	26	207	...	...	450	450	...	...	
	27	174	...	...	418	418	...	...	
	28	139	...	...	402	402	...	...	
	29	139	...	...	370	370	...	...	
	30	146	...	...	354	354	...	...	
	31	114	...	...	338	338	...	...	
		...	2,338	1,790	...	...	5,420	321	
		...	6.251	4,687	...	...	12,396	321	
November 1905.	1	112	...	...	322	322	...	...	
	2	112	...	...	306	306	...	...	
	3	93	...	..	218	218	...	...	
	4	93	...	...	272	272	...	...	
	4	97	...	...	236	236	...	...	
	6	97	...	...	236	236	...	...	1,000
	7	97	...	...	236	236	...	...	
	8	126	...	...	236	236	...	...	
	9	117	...	...	236	236	...	...	
	10	89	...	...	254	254	...	...	
	11	89	...	...	402	402	...	...	
	12	89	...	...	322	322	...	...	
	13	76	...	...	306	306	...	...	
	14	76	...	...	306	306	...	...	
	15	64	...	...	272	272	...	...	
		...	...	...	...	...	...	...	
	16	65	...	...	254	254	...	...	
	17	71	...	...	290	290	...	...	
	18	71	...	...	370	370	...	...	
	19	71	...	...	338	338	...	...	
	20	71	...	...	322	322	...	...	
	21	71	...	...	322	322	...	...	696
	22	69	...	...	322	322	...	...	
	23	69	...	...	322	322	...	...	
	24	69	...	...	338	338	...	...	
	25	69	...	...	560	560	...	...	
	26	84	...	...	434	434	...	...	
	27	145	...	...	386	386	...	...	
	28	190	...	...	354	354	...	...	
	29	177	...	...	338	338	...	...	
	30	93	...	...	322	322	...	...	
		...	...	...	...	...	...	...	
		...	...	...	...	...	...	...	

(B) 014536

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ¾ × col. 9 from June to Sept. and ⅓ × col. 9 from Oct. to January.	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. ¾ of col. 3	Discharges at Cauvery Dam	Cauvery Dam as affected	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limits of flow allowed at Cauvery Dam.
1		2	3	4	5	6	7	8	9
December 1905.	1	128	...	...	338	338	...	...	
	2	71	...	...	354	354	...	...	
	3	71	...	...	338	338	...	...	
	4	70	...	...	322	322	...	...	
	5	76	...	...	322	322	...	...	
	6	83	...	...	290	290	...	...	
	7	67	...	...	272	272	...	...	
	8	61	...	...	254	254	...	...	538
	9	61	...	...	236	236	...	...	
	10	58	...	...	218	218	...	...	
	11	58	...	...	218	218	...	...	
	12	58	...	...	200	200	...	...	
	13	58	...	...	185	185	...	...	
	14	58	...	...	186	186	...	...	
	15	58	...	...	186	186	...	...	
		...	...	...	...	...	...	...	
	16	56	...	...	186	186	...	...	
	17	60	...	...	172	172	...	...	
	18	12	...	...	158	158	...	...	
	19	12	...	...	158	158	...	...	
	20	265	142	107	144	37	...	107	
	21	265	142	107	144	37	...	107	
	22	265	142	107	98	—9*	...	98	
	23	...	...	...	82	82	...	...	370
	24	...	...	...	82	82	...	...	
	25	...	...	...	50	50	...	...	
	26	...	...	...	66	66	...	...	
	27	16	...	...	44	44	...	...	
	28	16	...	...	32	32	...	...	
	29	16	...	...	32	32	...	...	
	30	16	...	...	32	32	...	...	
	31	23	...	...	26	26	...	...	
		...	426	321	...	...	...	312	
		...	426	321	...	...	...	312	
January 1906.	1	14	...	...	20	20	...	...	
	2	20	...	...	20	20	...	...	
	3	20	...	...	20	20	...	...	
	4	20	...	...	16	16	...	...	
	5	20	...	...	16	16	...	...	
	6	20	...	...	8	8	...	...	
	7	25	...	...	8	8	...	...	290
	8	25	...	...	8	8	...	...	
	9	14	...	...	8	8	...	...	
	10	14	...	...	8	8	...	...	
	11	136	39	29	4	—25*	...	4	
	12	27	...	...	4	4	...	...	
	13	28	...	...	4	4	...	...	
	14	44	...	...	8	8	...	...	
	15	301	204	151	16	—135*	...	16	
		...	243	...	...	180	...	20	

* When col. (6) is negative, natural flow is entered in deficit col. (8).

Month and date	Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = $\frac{5}{6}$ × col. 9 from June to Sept. and $\frac{1}{3}$ × col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses. $\frac{3}{4}$ of col. 3	Discharges at Cauvery Dam	Cauvery Dam as affected	Quantity in excess of the limit, running to waste.	Deficit in Madras supplies	Limits of flow allowed at Cauvery Dam
1	2	3	4	5	6	7	8	9
January 1906 16	301	204	151	12	—139	...	12	
17	301	204	151	12	—139	...	12	
18	301	204	151	16	—135	...	16	
19	301	204	151	338	187	...	103	
20	301	204	151	200	49	...	151	
21	64	...	...	172	172	...	...	
22	64	...	...	144	144	...	...	
23	64	...	...	114	114	...	...	290
24	55	...	...	98	98	...	...	
25	49	...	...	65	65	...	...	
26	49	...	...	82	82	...	...	
27	35	...	...	50	50	...	...	
28	35	...	...	44	44	...	...	
29	27	...	...	44	44	...	...	
30	28	...	...	44	44	...	...	
31	27	...	...	38	38	...	...	
	...	1,020	755	...	...	...	294	
	...	1,263	935	...	...	...	314	

LIMIT OF RULES. TABLE II. 1905-06.

Month and date		X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col. 10	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	Cauvery Dam discharges as affected	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
June 1905.	1	322	...	...	...	...	...	322	...	
	2	272	...	...	...	...	...	272	...	
	3	272	...	...	...	...	...	272	...	
	4	218	...	...	...	...	...	218	...	
	5	370	...	...	...	...	...	370	...	
	6	322	...	...	...	...	...	322	...	
	7	290	...	...	...	...	...	290	...	
	8	236	...	...	1	...	...	236	...	450
	9	236	...	...	1	...	...	236	...	
	10	200	...	...	1	...	...	200	...	
	11	218	...	...	1	...	...	218	...	
	12	254	...	...	95	...	...	254	...	
	13	200	...	...	641	...	...	200	...	
	14	158	...	...	151	...	...	158	...	
	15	138	...	...	33	...	...	138	...	
		...	...	...	...	...	...	...	...	
	16	186	...	...	132	...	...	186	...	
	17	186	...	...	132	...	...	186	...	
	18	158	...	...	138	...	...	158	...	
	19	130	...	...	1,160	...	...	130	...	
	20	594	...	...	1,447	...	...	594	...	
	21	538	...	...	1,263	...	...	538	...	
	22	1,818	758	1,010	210	210	157	1,661	...	
	23	1,287	227	303	177	177	133	1,154	...	1,060
	24	851	...	...	144	...	...	851	...	
	25	662	...	...	135	...	...	662	...	
	26	594	...	...	328	...	...	594	...	
	27	704	...	...	328	...	...	704	...	
	28	1,579	519	692	405	405	304	1,275	...	
	29	3,697	2,639	3,519	569	569	427	3,270	...	
	30	3,638	2,578	3,434	728	723	542	3,096	...	
		...	...	8,958	...	2,084	...	...	...	
		...	...	...	...	...	...	...	...	
July 1905.	1	3,802	2,177	2,903	1,141	1,141	856	2,946	1,321	
	2	3,680	2,055	2,740	1,172	1,172	879	2,801	1,176	
	3	2,834	1,211	1,615	1,044	1,044	783	2,051	426	
	4	2,020	395	527	855	527	393	827	...	
	5	1,495	...	...	676	...	...	1,495	...	
	6	1,000	...	...	612	...	...	1,000	...	
	7	730	...	...	584	...	...	730	...	1,625
	8	730	...	...	2,714	...	...	730	...	
	9	4,077	2,452	3,269	2,804	2,804	2,103	1,974	349	
	10	3,161	1,536	2,048	2,991	2,048	1,536	1,625	...	
	11	2,160	535	713	795	713	535	1,625	...	
	12	1,625	...	...	631	...	...	1,625	...	
	13	1,240	...	...	654	...	...	1,240	...	
	14	892	...	...	573	...	...	892	...	
	15	628	...	...	534	...	...	628	...	
		...	...	...	...	9,449	...	...	3,272	

LIMIT OF RULES. TABLE II. 1905-06.

Month and date		X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col. 10	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	Cauvery Dam discharges as affected	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
July 1905.	16	538	...	...	556	...	...	538	...	
	17	472	...	...	556	...	...	472	...	
	18	516	...	...	556	...	...	516	...	
	19	628	...	...	1,233	...	...	628	...	
	20	3,657	2,032	2,709	1,802	1,802	1,326	2,331	706	
	21	7,516	5,891	7,855	4,017	4,017	3,013	4,503	2,878	
	22	7,859	6,234	8,312	5,924	5,924	4,468	3,391	1,766	
	23	8,003	6,378	8,501	6,695	6,695	5,021	2,982	1,357	1,625
	24	6,516	4,891	6,521	6,005	6,005	4,504	2,012	387	
	25	4,664	3,039	4,052	3,606	3,606	2,704	1,960	335	
	26	4,585	2,960	3,946	2,770	2,770	2,077	2,508	883	
	27	4,133	2,508	3,344	2,486	2,486	1,864	2,269	844	
	28	4,133	2,508	3,344	2,173	2,173	1,630	2,503	878	
	29	3,046	1,421	1,895	2,029	1,895	1,421	1,625	...	
	30	2,698	1,073	2,097	1,958	1,958	1,448	1,250	...	
	31	2,650	1,025	1,367	1,821	1,367	1,025	1,625	...	
		...	...	...	...	...	...	...	...	
		...	...	...	...	50,147	...	...	13,306	
August 1905.	1	2,440	815	1,087	1,382	1,087	815	1,625	...	
	2	2,222	597	796	1,733	796	597	1,625	...	
	3	2,074	449	665	1,676	665	499	1,625	...	
	4	1,859	234	312	994	312	234	1,625	...	
	5	1,573	...	...	549	...	...	1,573	...	
	6	1,232	...	...	709	...	...	1,232	...	
	7	981	...	...	666	...	...	981	...	
	8	803	...	...	592	...	...	803	...	1,625
	9	662	...	...	595	...	...	662	...	
	10	594	...	...	561	...	...	594	...	
	11	560	...	...	561	...	...	560	...	
	12	538	...	...	658	...	...	538	...	
	13	516	...	...	545	...	...	516	...	
	14	594	...	...	379	...	...	594	...	
	15	784	...	...	565	...	...	784	...	
		...	...	...	...	2,860	...	...	...	
	16	628	...	...	556	...	...	628	...	
	17	538	...	...	731	...	...	538	...	
	18	516	...	...	731	...	...	516	...	
	19	696	...	...	731	...	...	696	...	
	20	851	...	...	689	...	...	851	...	
	21	1,116	...	...	763	...	...	1,116	...	
	22	1,116	...	...	1,134	...	...	1,116	...	
	23	1,116	...	...	1,304	...	...	1,116	...	
	24	1,062	...	...	922	...	...	1,062	...	1,625
	25	1,116	...	...	1,094	...	...	1,116	...	
	26	1,170	...	...	1,534	...	...	1,170	...	
	27	1,345	...	...	1,059	...	...	1,345	...	
	28	1,345	...	...	985	...	...	1,345	...	
	29	1,696	71	95	1,057	95	71	1,625	..	
	30	1,696	71	95	1,074	95	71	1,625	...	
	31	1,755	130	173	981	173	130	1,625	...	
		...	...	...	...	363	...	...	...	
		...	...	...	...	3,223	...	...	...	

LIMIT OF RULES. TABLE II. 1905-06.

Month and date		X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col. 10	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses $C = \frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	Cauvery Dam discharges as affected	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
September 1905.	1	1,755	130	140	879	..	...	1,755	...	
	2	1,170	...	...	782	...	...	1,170	...	
	3	851	...	...	750	...	...	851	...	
	4	892	...	....	847	...	...	892	...	
	5	838	...	...	584	...	...	838	...	
	6	784	...	...	869	...	...	784	...	
	7	838	...	...	1,163	...	...	838	...	
	8	1,536	...	...	1,392	...	...	1,536	...	1,625
	9.	2,320	695	927	1,503	927	718	1,402	...	
	10	2,089	461	615	1,471	615	461	1,628	3	
	11	1,798	173	321	1,136	321	241	1,557	...	
	12	1,498	...	...	1,035	...	...	1,498	...	
	13	1,300	...	...	997	...	...	1,300	...	
	14	1,060	...	...	646	...	...	1,060	...	
	15	1,365	...	...	616	...	...	1,365	...	
		...	...	...	...	1,863	...	...	3	
	16	730	...	...	457	...	...	730	...	
	17	662	...	...	431	...	..	662	...	
	18	1,365	245	327	383	327	245	1,120	...	
	19	730	...	...	374	...	...	730	...	
	20	594	...	...	355	...	...	594	...	
	21	494	...	...	300	...	...	494	...	
	22	450	...	...	290	...	...	450	...	
	23	434	...	...	278	...	...	434	...	1,120
	24	386	...	...	238	...	...	386	...	
	25	354	...	...	238	...	...	354	...	
	26	338	...	...	267	...	...	338	...	
	27	338	...	...	268	...	...	338	...	
	28	338	...	...	217	...	...	338	...	
	29	338	...	...	206	...	...	338	...	
	30	322	...	...	145	...	...	322	...	
		...	...	...	...	327	...	...	...	
		...	...	...	...	2,190	...	...	3	
October 1905.	1	322	...	...	142	...	...	322	...	
	2	322	...	...	142	...	...	322	...	
	3	338	...	...	174	...	...	338	...	
	4	1,062	...	...	234	...	...	1,062	...	
	5	628	...	...	201	...	...	628	...	
	6	472	...	...	214	...	...	472	...	
	7	851	...	...	237	...	...	851	...	
	8	3,336	2,096	2,795	196	196	147	3,189	1,949	1,240
	9	2,346	1,106	1,475	181	181	136	2,210	970	
	10	3,140	1,900	2,533	159	159	119	3,021	1,781	
	11	2,178	938	1,251	258	258	193	1,985	745	
	12	2,192	952	1,269	595	595	446	1,746	506	
	13	4,892	3,652	4,869	914	914	685	4,207	2,967	
	14	3,879	2,639	3,519	1,245	1,245	934	2,945	1,705	
	15	3,870	2,630	3,507	2,761	2,761	2,071	1,789	549	
		...	...	...	...	6,609	...	...	11,172	

LIMIT OF RULES. TABLE II. 1905-06.

Month and date		X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col. 10	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	Cauvery Dam discharges as affected	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
October 1905.	16	4,190	2,950	3,933	1,415	1,415	1,061	3,129	1,889	
	17	3,001	1,761	2,348	912	912	684	2,317	1,077	
	18	2,305	1,065	1,420	726	726	544	1,761	521	
	19	2,353	1,113	1,484	559	559	419	1,934	694	
	20	1,048	...	...	760	...	...	1,048	...	
	21	1,000	...	...	493	...	...	1,000	...	
	22	838	...	...	414	...	...	838	...	
	23	662	...	...	348	...	...	662	...	1,240
	24	560	...	...	278	...	...	560	...	
	25	516	...	...	205	...	...	516	...	
	26	450	...	...	207	...	...	450	...	
	27	418	...	...	174	...	...	418	...	
	28	402	...	...	139	...	...	402	...	
	29	370	...	...	139	...	...	370	...	
	30	354	...	...	146	...	...	354	...	
	31	338	...	...	114	...	...	338	...	
		...	...	...	...	3,612	...	...	4,181	
		...	...	...	...	10,221	...	...	15,353	
November 1905.	1	322	...	...	112	...	...	322	...	
	2	306	...	...	112	...	...	306	...	
	3	218	...	...	93	...	...	218	...	
	4	272	...	...	93	...	...	272	...	
	5	236	...	...	97	...	...	236	...	
	6	236	...	...	97	...	...	236	...	
	7	236	...	...	97	...	...	236	...	
	8	236	...	...	126	...	...	236	...	1,000
	9	236	...	...	117	...	...	236	...	
	10	254	...	...	89	...	...	254	...	
	11	402	...	...	89	...	...	402	...	
	12	322	...	...	89	...	...	322	...	
	13	306	...	...	76	...	...	306	...	
	14	306	...	...	76	...	...	306	...	
	15	272	...	...	64	...	...	272	...	
		...	...	...	...	...	...	...	...	
	16	254	...	...	65	...	...	254	...	
	17	290	...	...	71	...	...	290	...	
	18	370	...	...	71	...	...	370	...	
	19	338	...	...	71	...	...	338	...	
	20	322	...	...	71	...	...	322	...	
	21	322	...	...	71	...	...	322	...	
	22	322	...	...	69	...	...	322	...	
	23	322	...	...	69	...	...	322	...	696
	24	338	...	...	69	...	...	322	...	
	25	560	...	...	69	...	...	338	...	
	26	434	...	...	84	...	...	560	...	
	27	386	...	...	145	...	...	434	...	
	28	354	...	...	190	...	...	386	...	
	29	338	...	...	177	...	...	354	...	
	30	322	...	...	93	...	...	338	...	
		...	...	...	...	...	...	322	...	
		...	...	...	...	...	...	...	...	
		...	...	...	...	...	...	...	...	

LIMIT OF RULES. TABLE II. 1905-06.

Month and date	X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col. 10	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	Cauvery Dam discharges as affected	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1	2	3	4	5	6	7	8	9	10
December 1905. 1	338	...	...	128	...	...	338	...	
2	354	...	...	71	...	...	354	...	
3	338	...	...	71	...	...	338	...	
4	322	...	...	70	...	...	322	...	
5	322	...	...	76	...	...	322	...	
6	290	...	...	83	...	...	290	...	
7	272	...	...	67	...	...	272	...	
8	254	...	...	61	...	...	254	...	538
9	236	...	...	61	...	...	236	...	
10	218	...	...	61	...	...	218	...	
11	218	...	...	58	...	...	218	...	
12	200	...	...	58	...	...	200	...	
13	185	...	...	58	...	...	185	...	
14	186	...	...	58	...	...	186	...	
15	186	...	...	58	...	...	186	...	
	...	...	...	...	...	...	...	...	
16	186	...	...	56	...	...	186	...	
17	172	...	...	60	...	...	172	...	
18	158	...	...	12	...	...	158	...	
19	158	...	...	12	...	...	158	...	
20	144	...	...	265	...	...	144	...	
21	144	...	...	265	...	...	144	...	
22	98	...	...	265	...	...	98	...	
23	82	...	...	...	...	...	82	...	
24	82	...	...	...	...	...	82	...	370
25	50	...	...	...	...	...	50	...	
26	66	...	...	...	...	...	66	...	
27	44	...	...	16	...	...	44	...	
28	32	...	...	16	...	...	32	...	
29	32	...	...	16	...	...	32	...	
30	32	...	...	16	...	...	32	...	
31	26	...	...	23	...	...	26	...	
	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	
January 1906. 1	20	...	...	14	...	...	20	...	
2	20	...	...	20	...	...	20	...	
3	20	...	...	20	...	...	20	...	
4	16	...	...	20	...	...	16	...	
5	16	...	...	20	...	...	16	...	
6	8	...	...	20	...	...	8	...	
7	8	...	...	25	...	...	8	...	
8	8	...	...	25	...	...	8	...	290
9	8	...	...	14	...	...	8	...	
10	8	...	...	14	...	...	8	...	
11	4	...	...	136	...	...	4	...	
12	4	...	...	27	...	...	4	...	
13	4	...	...	28	...	...	4	...	
14	8	...	...	44	...	...	8	...	
15	16	...	...	301	...	...	16	...	
	...	...	...	...	...	...	...	...	

Month and date	1	X = Discharges at Cauvery Dam 3 days later	X-Z = Surplussing to waste Z = Col 10.	$\frac{X-Z}{C}$ = Equivalent of column 3 at Kannambadi Dam allowing for transmission losses C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam		
January 1906.							
16		12	...	...	301	...	...
17		12	...	...	301	...	...
18		16	...	...	301	...	...
19		338	...	...	301	...	...
20		200	...	...	301	...	...
21		172	...	...	64	...	...
22		144	...	...	64	...	...
23		114	...	...	64	...	...
24		98	...	...	55	...	...
25		65	...	...	49	...	...
26		82	...	...	49	...	...
27		50	...	...	35	...	...
28		44	...	...	35	...	...
29		44	...	...	27	...	...
30		44	...	...	28	...	...
31		38	...	...	27	...	...

Storage at Kannambadi	6	...	...	...	...	...	...
Equivalent of column 6 at Cauvery Dam $\frac{3}{4}$ of col. 6	7	...	...	...	...	...	...
Cauvery Dam discharges as affected	8	12	...	...	...	...	...
		12					
		16					
		338					
		200					
		172					
		144					
		114					
		98					
		65					
		82					
		50					
		44					
		44					
		44					
		38					
Quantity running to waste at Cauvery Dam after storage at Kannambadi	9	...	...	...	...	...	...
Limit of flow allowed at Cauvery Dam	10	290					

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	*a*	*b*	*c*	*d*	*e*	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*e*) at Cauvery Dam = ¾ of Col. 2 (*e*)	Net flow at Cauvery Dam. Col. 3 − Col. 4 + ¾ of surplus at Kannambadi, if any	Compensation water, Col 3, if less than Z or Z − Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5 + col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir Col. 2 (*e*) + previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
	Y = Flow at Kannambadi in m.c.ft.	NY = Probable flow at Cauvery Dam N = 2 from June to September N = 3 from October to January	NY − z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	NY − z / c = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ¾ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less														
June 1905.																			
1	...	...	...	...	...	322	...	322	...	322	...	...	10,000	..	43	...	43	9,957	
2	...	...	...	...	...	272	...	272	...	272	...	...	9,957	...	43	...	43	9,941	
3	...	...	...	...	...	272	...	272	...	272	...	...	9,914	...	43	...	43	...	
4	...	...	...	...	...	218	...	218	...	218	...	...	...	...	43	...	43	...	
5	...	...	...	...	...	370	...	370	...	370	...	...	...	...	43	...	43	...	
6	...	...	...	...	...	322	...	322	...	322	...	...	...	...	43	...	43	...	
7	...	...	...	...	...	290	...	290	...	290	...	...	...	...	43	...	43	...	
8	1	...	...	...	...	236	...	236	...	236	...	...	...	...	43	...	43	...	1st half
9	1	...	...	...	...	236	...	236	...	236	...	...	..	...	43	...	43	...	450
10	1	...	...	...	...	200	...	200	...	200	...	...	...	...	43	...	43	...	
11	1	...	...	...	...	218	...	218	...	218	...	...	...	...	43	...	43	9,527	
12	95	...	...	...	...	251	...	254	...	254	...	...	9,527	...	43	...	43	9,494	
13	641	1,026	576	768	641	200	180	−280	200	−280	..	...	10,125	...	43	...	43	10,082	
14	161	...	...	...	...	158	...	158	...	158	...	...	10,082	...	43	...	43	10,039	
15	33	...	...	...	...	130	...	130	...	130	...	...	10,039	...	43	...	43	9,996	
	924	...	...	...	641	3,698	...	...	200	...	...	...	...	...	...	...	...	...	
16	132	...	...	...	...	186	...	186	...	386	...	...	9,966	267	152	...	419	9,577	
17	132	...	...	...	...	186	...	186	...	186	...	...	9,577	...	152	...	152	9,425	
18	158	...	...	...	...	158	...	158	...	158	...	...	9,425	...	152	...	152	9,273	
19	1,160	1,856	796	1,061	1,061	130	796	−666	130	−666	...	...	10,331	...	152	...	152	10,182	
20	1,447	2,315	1,255	1,673	1,447	594	1,085	−491	594	−491	...	...	11,629	...	152	...	152	11,477	
21	1,263	2,021	961	1,281	1,263	538	947	−109	538	−109	...	...	12,740	...	152	...	152	12,588	
22	210	...	...	...	...	1,818	...	1,818	..	1,948	888	130	12,588	173	152	...	325	12,263	
23	177	...	...	...	...	1,287	...	1,287	...	1,881	821	591	12,263	792	152	...	944	11,319	1,060
24	144	...	...	...	...	851	...	851	...	1,380	329	269	11,319	717	152	...	869	10,450	
25	135	...	...	...	...	662	...	622	...	662	...	...	10,450	...	152	...	152	10,298	
26	328	...	...	...	...	591	...	591	...	591	...	...	10,298	...	152	...	152	10,146	
27	328	...	...	...	...	704	...	754	...	754	...	...	10,146	...	152	...	152	9,994	
28	405	...	...	...	...	1,579	...	1,579	...	1,579	...	...	9,994	...	152	...	152	9,842	
29	569	...	...	...	...	3,697	...	3,697	...	3,697	...	...	9,842	...	152	...	152	9,690	
30	723	1,157	97	129	129	3,638	97	3,541	...	3,541	...	...	9,819	...	152	...	152	9,667	
	7,291	...	...	...	3,900	16,672	...	...	1,262	...	2,036	993	...	1,949	...	...	...	...	
	8,215	...	..	...	4,541	20,370	..	...	1,462	...	2,036	993	...	1,949	...	...	...	...	

1		Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
		2					3	4	5	6	7	8	9	10	11	12	13	14	15	
		a	*b*	*c*	*d*	*e*														
Month and date		Y = Flow at Kannambadi in m. c. ft.	NY = Probable flow at Cauvery Dam N = 2 from June to September N = 3 from October to January	NY − z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	$\frac{NY-z}{o}$ = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ⅓ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ⅔ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+⅔ of surplus at Kannambadi, if any	Compensation water, Col 3, if less than Z or Z—Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*) + previous days' balance in Col. 16	Compensation water converted to Kannambadi Reservoir, *i. e.*, ⅔ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
July 1905.	1	1,141	1,826	201	268	268	3,802	201	3,601	...	3,601	1,976	...	9,935	...	156	...	156	9,779	
	2	1,172	1,875	250	333	333	3,680	250	3,430	...	3,430	1,805	...	10,112	...	156	...	156	9,956	
	3	1,014	1,670	45	60	60	2,834	45	2,789	...	2,789	1,164	...	10,016	129	156	...	285	9,731	
	4	855	...	...	...	...	2,020	...	2,020	...	2,020	395	...	9,731	...	156	...	156	9,575	
	5	676	...	...	...	...	1,495	...	1,495	...	1,495	--	...	9,575	...	156	...	156	9,419	
	6	612	...	...	...	...	1,000	...	1,000	...	1,000	...	...	9,419	...	156	...	156	9,263	1,625
	7	584	...	...	...	...	730	...	730	...	730	...	...	9,263	...	156	...	156	9,107	
	8	2,714	4,342	2,717	3,623	2,714	730	2,036	—1,306*	730	—1,306	...	...	11,821	...	156	...	156	11,665	
	9	2,804	4,486	2,861	3,815	2,804	4,077	2,103	1,974	...	1,974	349	...	14,469	...	156	...	156	14,313	
	10	1,991	3,186	1,561	2,081	1,991	3,161	1,493	1,668	...	1,668	63	...	16,304	...	156	...	156	16,148	
	11	795	...	...	...	...	2,160	...	2,160	...	2,890	1,265	730	16,148	973	156	...	1,129	15,019	
	12	631	...	...	...	...	1,625	...	1,625	...	1,625	...	...	...	...	156	...	156	...	
	13	654	...	...	...	...	1,240	...	1,240	...	1,240	...	...	...	...	156	...	156	...	
	14	573	...	...	...	...	892	...	892	...	892	...	...	...	...	156	...	156	...	
	15	534	...	...	...	...	628	...	628	...	...	...	...	...	...	156	...	156	...	
		...	...	...	...	8,170	30,074	...	...	730	...	7,017	730	...	1,102	...	...	...	...	
	16	556	...	...	...	...	538	...	538	...	538	...	...	...	...	156	...	156	...	
	17	556	...	...	...	...	472	...	472	...	472	...	...	...	...	156	...	156	...	
	18	556	...	...	...	...	516	...	516	...	516	...	...	...	...	156	...	156	13,927	
	19	1,233	1,973	318	464	464	628	348	280	348	280	...	...	14,391	...	156	...	156	14,235	
	20	1,802	2,883	1,258	1,677	1,677	3 657	1,258	2,399	...	2,399	774	...	15,912	...	156	...	156	15,756	
	21	4,017	6,427	4,802	6,403	4,017	7,516	3,013	4,503	...	4,503	2,878	...	19,773	...	156	...	156	19,617	
	22	5,924	9,478	7,853	10,471	5,921	7,859	4,443	3,416	...	3,764	2,139	348	25,541	464	156	...	620	24,921	
	23	6,695	10,712	9,087	12,116	6,695	8,003	5,021	2,982	...	2,982	1,357	..	31,616	...	156	...	156	31,460	
	24	6,005	9,608	7,983	10,644	6,005	6,516	4,501	2,184	...	2,184	559	...	37,465	...	156	229	385	37,080	1,625
	25	3,606	5,770	4,145	5,527	3,606	4 664	2,704	4,548	...	4,548	2,923	...	40,686	...	156	3,450	3,606	37,080	
	26	2,770	4,432	2,807	3,743	2,770	4 585	2,078	4,468	...	4,468	2,813	...	39,850	...	156	2,614	2,770	37,080	
	27	2,486	3,978	2,353	3,137	2,486	4,133	1,864	4,016	...	4,016	1,391	...	39,566	...	156	2,330	2,486	37,080	
	28	2,173	3,477	1,852	2,469	2,173	4,133	1,630	4,016	...	4,016	1,391	...	39,253	...	156	2,017	2,173	37,080	
	29	2,029	3,246	1,621	2,161	2,029	3,046	1,522	2,929	...	2,929	1,304	...	39,109	...	156	1,473	2,029	37,080	
	30	1,958	3,133	1,508	2,011	1,958	2,698	1,468	2,581	...	2,581	956	...	39,038	...	156	1,802	1,958	37,080	
	31	1,821	2,914	1,289	1,719	1,719	2,650	1,289	2,533	...	2,533	908	...	38,799	...	156	1,561	1,719	37,080	
		...	...	...	...	41,523.	61,614	...	...	348	...	19,423	348	...	464	...	15,476	...	...	
		...	...	...	...	49,693	91,688	...	...	1,078	...	26,440	1,078	...	1,566	...	15,476	...	...	

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y = Flow at Kannambadi in m. c. ft.	NY = Probable flow at Cauvery Dam N = $\frac{5}{8}$ from June to September N = 3 from October to January	NY − z = Probable excess over the limit at Cauvery dam Z = limit in Col. 16	$\frac{NY-z}{6}$ = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, $\frac{3}{4}$ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = $\frac{3}{4}$ of Col. 2 (*c*)	Net flow at Cauvery Dam Col. 3 − Col. 4 + $\frac{3}{4}$ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z − Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5 + Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*) + previous days' balance in Col. 16	Compensation water converted to Kannambadi Reservoir, *i.e.*, $\frac{3}{4}$ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
August 1905.																			
1	1,382	2,211	586	781	781	2,440	586	2,327	...	2,323	702	...	37,861	...	156	631	781	37,080	
2	1,733	2,773	1,148	1,531	1,531	2,222	1,148	2,105	...	2,105	480	...	38,611	...	156	1,375	1,531	37,080	
3	1,676	2,682	1,057	1,409	1,409	2,074	1,057	1,957	...	1,917	332	...	38,486	...	156	1,253	1,409	37,080	
4	994	...	...	...	...	1,859	...	1,859	...	1,859	224	...	37,080	...	156	...	156	...	
5	549	...	...	...	...	1,573	...	1,573	...	1,573	...	...	...	...	156	...	156	...	
6	709	...	...	...	...	1,232	...	1,232	...	1,232	...	...	...	...	156	...	156	...	
7	666	...	...	...	...	981	...	981	...	981	...	...	...	...	156	...	156	...	
8	592	...	...	...	...	803	...	803	...	803	...	...	...	...	156	...	156	...	
9	595	...	...	...	...	662	...	662	...	662	...	...	...	...	156	...	156	...	
10	561	...	...	...	...	594	...	594	...	594	...	...	...	...	156	...	156	...	1,625
11	561	...	...	...	...	560	...	560	...	560	...	...	...	...	156	...	156	...	
12	658	...	...	...	...	538	...	538	...	538	...	...	...	...	156	...	156	...	
13	545	...	...	...	...	516	...	516	...	516	...	...	...	...	156	...	156	...	
14	379	...	...	...	...	594	...	594	...	594	...	...	...	...	156	...	156	...	
15	565	...	...	...	...	784	...	784	...	784	...	...	...	...	156	...	156	...	
	...	...	...	...	3,721	...	...	...	...	...	1,748	...	...	...	...	3,206	...	...	
16	556	...	...	...	...	628	...	628	...	628	...	...	...	...	156	...	156	...	
17	731	...	...	...	...	538	...	538	...	538	...	...	...	...	156	...	156	...	
18	731	...	...	...	...	516	...	516	...	516	...	...	...	...	156	...	156	...	
19	731	...	...	...	...	696	...	696	...	696	...	...	...	...	156	...	156	...	
20	689	...	...	...	...	851	...	851	...	851	...	...	...	...	156	...	156	...	
21	763	...	...	...	...	1,116	...	1,116	...	1,116	...	...	...	...	156	...	156	...	
22	1,134	1,814	189	252	252	1,116	189	927	189	927	...	...	34,428	...	156	...	156	34,272	
23	1,301	2,086	461	615	615	1,116	461	655	461	655	...	...	34,524	...	156	...	156	34,368	
24	922	...	...	...	...	1,062	...	1,062	...	1,062	...	...	34,983	...	156	...	156	34,827	
25	1,091	1,750	125	167	167	1,116	125	986	125	1,175	...	...	34,827	...	156	...	156	34,671	
26	1,531	2,451	829	1,105	1,105	1,170	829	341	829	802	...	...	34,838	252	156	...	408	34,430	1,625
27	1,059	1,694	69	92	92	1,345	69	1,276	69	1,276	...	...	35,535	615	556	...	771	34,764	
28	965	...	...	...	...	1,345	...	1,345	...	1,470	...	...	34,856	...	156	...	156	34,700	
29	1,057	1,691	66	88	88	1,696	66	1,630	66	2,459	934	829	34,700	167	156	...	323	34,377	
30	1,074	1,718	93	124	124	1,696	93	1,603	93	1,672	47	47	34,465	1,105	156	...	1,261	33,204	
31	981	...	...	...	..	1,755	...	1,755	...	1,755	130	...	33,328	92	156	...	248	33,080	
	...	...	...	...	2,443	...	...	...	1,832	...	1,011	876	...	2,231	...	...	...	...	
	...	...	...	...	6,164	...	...	...	1,832	...	2,759	876	...	2,231	...	3,206	...	...	

1		Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
		2					3	4	5	6	7	8	9	10	11	12	13	14	15	
		a	*b*	*c*	*d*	*e*														
Month and date		Y = Flow at Kannambadi in m.c.ft.	NY = Probable flow at Cauvery Dam N = 2 from June to September N = 3 from October to January	NY − z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	$\frac{NY-z}{c}$ = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ⅓ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ⅓ of Col. 2 (*c*)	Net flow at Cauvery Dam. Col. 3—Col. 4+⅓ of surplus at Kannambadi, if any	Compensation water Col. 3, if less than Z or Z—Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ⅓ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
September 1905.	1	879	...	...	...	...	1,755	...	1,755	...	1,755	...	...	32,924	88	156	...	244	32,680	
	2	782	...	...	...	...	1,170	...	1,170	...	1,170	...	...	32,680	124	156	...	280	32,400	
	3	750	...	...	...	...	851	...	851	...	851	...	...	32,400	...	156	...	156	...	
	4	847	...	...	...	...	892	...	892	...	892	...	...	...	...	156	...	156	...	
	5	581	...	...	...	...	838	...	838	...	838	...	...	...	...	156	...	156	...	
	6	869	...	...	...	...	784	...	784	...	784	...	...	31,932	...	156	...	156	31,776	
	7	1,163	1,861	236	315	315	838	236	602	236	602	...	...	32,091	...	156	...	156	31,935	
	8	1,392	2,227	602	803	803	1,536	602	934	602	934	...	...	32,738	...	156	...	156	32,582	
	9	1,503	2,405	780	1,010	1,010	2,320	780	1,510	85	1,510	...	...	33,642	...	156	...	156	33,466	
	10	1,471	2,354	729	972	972	2,089	729	1,360	265	1,536	...	...	33,558	235	156	...	391	33,167*	1,625
	11	1,136	1,818	193	257	257	1,798	193	1,605	20	1,807	182	182	33,424	803	155	...	959	32,465	
	12	1,035	1,656	31	41	41	1,495	31	1,464	...	1,461	...	...	32,506	...	156	...	156	32,350	
	13	997	...	...	...	...	1,300	...	1,300	...	1,565	...	...	32,350	353	156	...	509	31,841	
	14	646	...	...	...	...	1,060	...	1,060	...	1,080	...	...	31,841	27	156	...	183	31,658	
	15	616	...	...	...	...	1,365	...	1,365	...	1,365	...	...	31,658	...	156	...	156	31,502	
		...	...	...	...	2,548	..	...	...	1,063	...	697	182	...	1,630	...	...	...	..	
	16	457	...	...	...	...	730	...	730	...	730	...	...	31,502	...	156	...	156	...	
	17	431	...	...	...	...	662	...	662	...	662	...	...	...	...	156	...	156	...	
	18	383	...	...	...	...	1,365	...	1,365	...	1,365	...	...	...	...	156	...	156	...	
	19	374	...	...	...	...	730	...	730	...	730	...	...	...	...	156	...	156	...	
	20	355	...	...	...	...	594	...	594	...	594	...	...	...	...	156	...	156	...	
	21	300	...	...	...	...	491	...	494	...	494	...	...	...	...	156	...	156	...	
	22	290	...	...	...	...	450	...	450	..	450	...	...	...	...	156	...	156	...	
	23	278	...	...	...	...	434	...	434	...	434	...	...	...	...	156	...	156	...	
	24	238	...	...	...	...	386	...	386	...	386	...	...	...	...	156	...	156	..	
	25	238	...	...	...	...	354	...	354	...	354	..	...	...	...	156	...	156	...	
	26	267	...	...	...	...	338	...	338	...	338	..	...	...	...	156	...	156	...	1,120
	27	268	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
	28	217	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
	29	206	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
	30	145	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	29,182	
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
		...	...	...	...	2,548	...	...	...	1,063	...	697	182	...	1,630	...	...	...	...	

* From the 10th September 1905 to the end of June 1906, add 680 to each of the figures in column 15.

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	*a*	*b*	*c*	*d*	*e*														
	Y=Flow at Kannambadi in m. c. ft.	NY=Probable flow at Cauvery Dam N=½ from June to September N=3 from October to January	NY—*z*=Probable excess over the limit at Cauvery Dam Z=limit in Col. 16	NY—$\frac{z}{c}$=Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ¾ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam=¾ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+¾ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5 Z=limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*)+ previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
October 1905.																			
1	142	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
2	142	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
3	174	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
4	237	...	...	...	...	1,062	...	1,062	...	1,062	...	...	...	...	156	...	156	...	
5	201	...	...	...	...	628	...	628	...	628	...	...	...	...	156	...	156	...	
6	214	...	...	...	...	472	...	472	...	472	...	...	...	...	156	...	156	...	
7	237	...	...	..	...	851	...	851	...	851	...	...	...	...	156	...	156	...	
8	196	...	...	...	...	3,336	...	3,336	..	3,336	2,096	...	...	...	156	...	156	...	
9	181	...	...	...	...	2,346	...	2,346	...	2,346	1,106	...	...	...	156	...	156	...	
10	159	...	...	...	...	3,140	...	3,140	...	3,140	1,900	...	...	...	156	...	156	...	1,240
11	258	...	...	...	...	2,178	...	2,178	...	2,178	938	...	...	...	156	...	156	...	
12	695	1,785	545	727	695	2,192	446	1,746	...	1,746	506	...	28,061	...	156	..	156	27,466	
13	914	2,742	1,502	2,003	914	4,892	685	4,207	...	4,207	2,987	...	28,819	...	156	...	156	27,901	
14	1,215	3,735	2,295	3,060	1,215	3,879	934	2,945	...	2,945	1,705	...	29,908	...	156	...	156	28,663	
15	2,761	8,283	7,043	9,391	2,761	3,370	2,071	1,799	...	1,799	559	...	32,513	...	156	...	156	32,357	
	...	...	...	...	4,515	...	...	...	...	...	11,797	...	...	...	...	...	...	...	
16	1,415	4,245	3,005	4,007	1,415	4,190	1,061	3,129	...	3,129	1,889	...	33,772	...	156	...	156	33,616	
17	912	2,736	1,496	1,995	912	3,001	684	2,317	...	2,317	1,077	...	34,528	...	156	...	156	34,372	
18	726	2,178	938	1,251	726	2,305	544	1,761	..	1,761	521	...	35,098	...	156	...	156	34,942	
19	559	1,677	437	583	559	2,353	419	1,931	...	1,934	694	...	35,501	...	156	...	156	35,345	
20	760	2,280	1,040	1,387	760	1,018	570	478	570	478	...	...	36,105	...	156	...	156	35,949	
21	493	1,479	239	319	319	1,000	239	761	239	761	...	...	36,268	...	156	...	156	36,112	
22	414	1,242	2	3	3	838	2	836	2	836	...	...	36,115		156	...	156	35,956	
23	348	...	...	...	...	662	...	662	...	1,232	...	...	35,956	760	156	...	156	35,040	
24	278	...	...	...	...	560	...	560	...	799	...	...	35,040	319	156	...	916	34,565	1,240
25	205	...	...	...	...	516	...	516	...	618	...	...	34,565	3	156	...	475	34,405	
26	207	...	...	...	...	450	...	450	...	450	...	...	34,406	...	156	...	159	...	
27	174	...	...	...	...	418	...	418	...	418	...	...	...	...	156	...	156	...	
28	139	...	...	...	...	402	...	402	...	402	...	...	...	...	156	...	156	...	
29	139	...	...	...	...	370	...	370	...	370	...	...	...	...	156	...	156	...	
30	146	...	...	...	...	354	...	354	...	354	...	...	...	...	156	...	156	...	
31	114	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	33,470	
	...	...	...	...	4,694	...	...	...	811	...	4,181	...	...	1,082	...	...	...	...	
	...	...	...	...	9,209	...	...	...	811	...	15,978	...	...	1,082	...	...	...	...	

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y = Flow at Kannambadi in m. c. ft.	NY = Probable flow at Cauvery Dam N = 2 from June to September N = 3 from October to January	NY—z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	$\frac{NY-z}{6}$ = Kannavabadi Dam, *i.e.*, ⅙ of Col 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ¾ of Col. 2 (*c*)	Net flow at Cauvery Dam Col. 3—Col. 4+¼ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5 Z—limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ⅙ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
November 1905.																			
1	112	...	...	...	...	322	...	322	...	322	...	...	33,470	...	156	...	156	...	1,000
2	112	...	...	...	...	306	...	306	...	306	...	...	...	...	156	...	156	...	
3	93	...	...	...	...	218	...	218	...	218	...	...	...	...	156	...	156	...	
4	93	...	...	...	...	272	...	272	...	272	...	...	...	...	156	...	156	...	
5	97	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
6	97	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
7	97	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
8	126	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
9	117	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
10	89	...	...	...	...	254	...	254	...	254	...	...	...	...	156	...	156	...	
11	89	...	...	...	...	402	...	402	...	402	...	...	...	...	156	...	156	...	
12	89	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
13	76	...	...	...	...	306	...	306	...	306	...	...	...	...	156	...	156	...	
14	76	...	...	...	...	306	...	306	...	306	...	...	...	...	156	...	156	...	
15	64	...	...	...	...	272	...	272	...	272	...	...	...	...	156	...	156	31,130	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	65	...	...	...	...	254	...	254	...	254	...	...	...	...	156	...	156	...	696
17	71	...	...	...	...	290	...	290	...	290	...	...	...	...	156	...	156	...	
18	71	...	...	...	...	370	...	370	...	370	...	...	...	...	156	...	156	...	
19	71	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
20	71	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
21	71	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
22	69	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
23	69	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
24	69	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
25	69	...	...	...	...	560	...	560	...	560	...	...	...	...	156	...	156	...	
26	84	...	...	...	...	434	...	434	...	434	...	...	...	...	156	...	156	...	
27	145	...	...	...	...	386	...	386	...	386	...	...	...	...	156	...	156	...	
28	190	...	...	...	...	354	...	354	...	354	...	...	...	...	156	...	156	...	
29	177	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
30	93	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	28,790	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

December 1905.

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y = Flow at Kannambadi in m. c. ft.	NY = Probable flow at Cauvery Dam N = ⅞ from June to September N = ¾ from October to January	NY—*z* = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	NY—*z* / *c* = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ⅞ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ¾ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+¾ of surplus at Kannambadi, if any	Compensation water Col. 3, if less than Z or Z—Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
1	128	...	...	...	...	338	...	338	...	338	...	...	28,790	...	156	...	156	...	
2	71	...	...	...	...	351	...	351	...	354	...	...	...	...	156	...	156	...	
3	71	...	...	...	...	338	...	338	...	338	...	...	...	...	156	...	156	...	
4	70	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
5	76	...	...	...	...	322	...	322	...	322	...	...	...	...	156	...	156	...	
6	83	...	...	...	...	290	...	290	...	290	...	...	...	...	156	...	156	...	
7	67	...	...	...	...	272	...	272	...	272	...	...	...	...	156	...	156	...	
8	61	...	...	...	...	254	...	254	...	254	...	...	...	...	156	...	156	...	
9	61	...	...	...	...	236	...	236	...	236	...	...	...	...	156	...	156	...	
10	58	...	...	...	...	218	...	218	...	218	...	...	...	...	156	...	156	...	538
11	58	...	...	...	...	218	...	218	...	218	...	...	...	...	156	...	156	...	
12	58	...	...	...	...	200	...	200	...	200	...	...	...	..	156	...	156	...	
13	58	...	...	...	...	186	...	186	...	186	...	...	...	...	156	...	156	...	
14	58	...	...	...	...	186	...	186	...	186	...	...	...	...	156	...	156	...	
15	58	...	...	...	...	186	...	186	...	186	...	...	26,606	...	156	...	156	26,450	
	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	
16	56	...	...	...	...	186	...	186	...	186	...	...	26,450	...	156	...	156	...	
17	60	..	...	...	...	172	...	172	...	172	...	...	...	...	156	...	156	...	
18	12	...	...	...	...	158	...	158	...	158	...	...	...	...	156	...	156	...	
19	12	...	...	...	...	158	...	158	...	158	...	...	25,982	...	156	...	156	25,826	
20	265	795	425	567	265	111	199	−55	144	−55	...	...	26,091	..	156	...	156	25,935	
21	265	795	425	567	265	144	199	−55	144	−55	...	...	26,200	...	156	...	156	26,044	370
22	265	795	425	567	265	98	199	−101	98	−101	...	...	26,309	...	156	...	156	26,153	
23	...	...	...	...	...	82	...	82	...	226	...	...	26,153	265	156	...	241	25,732	
24	...	...	...	...	...	82	...	82	...	226	...	...	25,732	265	156	...	421	25,311	
25	...	...	...	...	...	50	...	50	...	148	...	...	25,311	265	156	...	421	24,890	
26	...	...	...	...	...	66	...	66	...	66	...	...	24,890	...	156	...	156	24,734	
27	16	...	...	...	...	44	...	44	...	44	...	...	...	...	156	...	156	...	
28	16	...	...	...	...	32	...	32	...	32	...	...	...	...	156	...	156	...	
29	16	...	...	...	...	32	...	32	...	32	...	...	...	...	156	...	156	...	
30	16	...	...	...	...	32	...	32	...	32	...	...	...	...	156	...	156	...	
31	24	...	...	...	...	26	...	26	...	26	...	...	24,110	...	156	...	156	23,954	
	...	...	...	..	795	...	...	...	386	...	...	...	...	795	...	...	...	...	
	...	...	...	...	795	...	...	...	386	...	...	...	...	795	...	...	...	...	

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y = Flow at Kannambadi in m. c. ft.	NY = Probable flow at Cauvery Dam N = 2/3 from June to September N = 3 from October to January	NY—z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	NY—z / 6 = Value of Col. 2 (*e*) at Kannambadi Dam, *i.e.*, 1/6 of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*e*) at Cauvery Dam = 1/4 of Col. (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+1/4 of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*)+previous days' balance in Col. 16	Compensation water converted to Kannambadi Reservoir, *i.e.*, 1/6 of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
January 1906.																			
1	14	...	...	...	...	20	...	20	...	20	...	...	23,957	...	156	...	156	23,957	
2	20	...	...	...	...	20	...	20	...	20	...	...	...	...	156	...	156	...	
3	20	...	...	...	...	20	...	20	...	20	...	...	...	...	156	...	156	...	
4	20	...	...	...	...	16	...	16	...	16	...	...	...	...	156	...	156	...	
5	20	...	...	...	...	16	...	16	...	16	...	...	23,333	...	156	...	156	23,177	
6	20	...	...	...	...	8	...	8	...	8	...	...	23,177	...	156+11	...	167	...	
7	25	...	...	...	...	8	...	8	...	8	...	...	...	...	156+11	...	167	...	
8	25	...	...	...	...	8	...	8	...	8	...	...	...	...	156+11	...	167	...	
9	14	...	...	...	...	8	...	8	...	8	...	...	...	...	156+11	...	167	...	
10	14	...	...	...	...	8	...	8	...	8	...	...	...	...	156+11	...	167	...	
11	136	...	...	...	...	4	...	4	...	4	...	...	...	...	156+11	...	167	...	
12	27	...	...	...	...	4	...	4	...	4	...	...	...	...	156+11	...	167	...	
13	28	...	...	...	...	4	...	4	...	4	...	...	...	...	156+11	...	167	...	
14	44	...	...	...	...	8	...	8	...	8	...	...	21,841	...	156+11	...	167	21,674	
15	301	...	...	...	...	16	...	16	...	16	...	...	21,674	...	156	...	156	21,518	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	301	...	...	...	...	12	...	12	...	12	...	...	21,518	...	43+6	...	49	...	
17	301	...	...	...	...	12	...	12	...	12	...	...	...	...	43+6	...	49	...	
18	301	...	...	...	...	16	...	16	..	16	...	...	...	...	43+6	...	49	...	
19	301	...	...	...	...	338	...	338	...	338	...	...	...	...	43+6	...	49	...	
20	301	...	...	...	...	200	...	200	...	200	...	...	...	...	43+6	...	49	...	
21	64	...	...	...	...	172	...	172	...	172	...	...	...	...	43+6	...	49	...	
22	64	...	..	...	...	144	...	144	...	144	...	...	...	...	43+6	...	49	...	
23	64	...	...	...	...	114	...	114	...	114	...	...	...	...	43+6	...	49	...	
24	55	...	...	...	...	98	...	98	...	98	...	...	...	...	43+6	...	49	...	
25	49	...	...	...	...	66	...	66	...	66	...	...	...	...	43+6	...	49	...	
26	49	...	...	...	...	82	...	82	...	82	...	...	...	...	43+6	...	49	...	
27	35	...	...	...	...	50	...	50	...	50	...	...	...	..	43+6	...	49	...	
28	35	...	...	...	...	44	...	44	...	44	...	...	...	...	43+6	...	49	...	
29	27	...	...	...	...	44	...	44	..	44	...	...	...	...	43+6	...	49	...	
30	28	...	...	...	...	44	...	44	...	44	...	...	...	...	43+6	...	49	...	
31	27	...	...	...	...	38	...	36	...	38	..	...	20,783	...	43+6	...	49	20,734	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

290

290

February 1906.

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y=Flow at Kannambadi in m.c. ft.	NY=Probable flow at Cauvery Dam N=$\frac{1}{2}$ from June to September N=3 from October to January	NY—*z*=Probable excess over the limit at Cauvery Dam Z=limit in Col. 16	NY-*z*=Value of Col. 2 (*c*) at $\frac{c}{4}$ Kannambadi Dam, *i.e.*, $\frac{1}{4}$ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m.c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam=$\frac{3}{4}$ of Col. 2 (*c*)	Net flow at Cauvery Dam Col. 3—Col. 4+$\frac{1}{4}$ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5 Z=limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, $\frac{4}{3}$ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full.	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
1	28	...	...	...	...	38	...	38	...	38	...	...	...	...	43+6	...	49	...	
2	23	...	...	...	...	32	...	32	...	32	...	...	20,734	...	43+6	...	49	...	
3	23	...	...	...	...	32	...	32	...	32	...	...	...	...	43+6	...	49	...	
4	23	...	...	...	...	32	...	32	...	32	...	...	...	...	43+6	...	49	...	
5	23	...	...	...	...	20	...	20	...	20	...	...	...	...	43+6	...	49	...	
6	23	...	...	...	...	20	...	20	...	20	...	...	...	...	18+6	...	49	20,410	
7	60	...	...	...	...	20	...	20	...	20	...	...	20,489	...	43+11	...	54	20,386	
8	65	...	...	...	...	20	...	20	...	20	...	...	20,440	...	43+11	...	54	20,332	
9	65	...	...	...	...	20	...	20	...	20	...	...	20,386	...	43+25	...	68	20,264	
10	25	...	...	...	...	20	...	20	...	20	...	...	20,332	...	43+37	...	80	...	
11	26	...	...	...	...	20	...	20	...	20	...	...	20,264	...	43+37	...	80	...	
12	26	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
13	3	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
14	3	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
15	3	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	19,794	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	3	...	...	...	...	...	...	...	...	...	...	...	19,784	...	43+37	...	80	...	
17	3	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
18	3	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
19	8	...	...	...	...	...	...	...	...	...	...	...	19,541	...	43+37	...	80	19,461	
20	8	...	...	...	...	...	...	...	...	...	...	...	19,464	...	43+42	...	85	19,379	
21	8	...	...	...	...	...	...	...	...	...	...	...	19,379	...	43+42	...	85	19,294	
22	8	...	...	...	...	...	...	...	...	...	...	...	19,294	...	43+43	...	86	19,208	
23	8	...	...	...	...	...	...	...	...	...	...	...	19,208	...	43+53	...	96	19,112	
24	8	...	...	...	...	...	...	...	...	...	...	...	19,112	...	43+49	...	92	19,020	
25	8	...	...	...	...	...	...	...	...	...	...	...	19,020	...	43+37	...	80	...	
26	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
27	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+37	...	80	18,700	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

TABLE III—*contd.*

March 1906.

Month and date	Approximations for quantity to be impounded				Conditions at the Cauvery Dam				Conditions at the Kannambadi Dam				
1	2				3	4	5	6	7	8	9	10	11
	a	*b*	*c*	*d*									
	Y=Flow at Kannambadi in m.c. ft.	NY=Probable flow at Cauvery Dam N=⅞ from June to September N=3 from October to January	NY—z=Probable excess over the limit at Cauvery Dam Z=limit in Col. 16	$\frac{NZ-z}{c}$=Value of Col. 2(*c*) at Kannambadi Dam, *i.e.*, ⅜ of Col. 2 (*c*)	Flow at the Cauvery Dam in m.c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam=⅜ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+⅞ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5 Z=limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ⅝ of Col. 6
1	8888	...	...	...	...	...	...	...	...	...	...	...	...
2	8888	...	...	...	...	...	...	...	...	...	...	...	...
3	8888	...	...	...	...	...	...	...	...	...	...	...	...
4	7777	...	...	...	...	...	...	...	...	...	...	...	...
5	9999	...	...	...	...	...	...	...	...	...	...	...	...
6	9999	...	...	...	...	...	...	...	...	...	...	...	...
7	8888	...	...	...	...	...	...	...	...	...	...	...	...
8	6666	...	...	...	...	...	...	...	...	...	...	...	...
9	6666	...	...	...	...	...	...	...	...	...	...	...	...
10	6666	...	...	...	...	...	...	...	...	...	...	...	...
11	6666	...	...	...	...	...	...	...	...	...	...	...	...
12	6666	...	...	...	...	...	...	...	...	...	...	...	...
13	6666	...	...	...	...	...	...	...	...	...	...	...	...
14	6666	...	...	...	...	...	...	...	...	...	...	...	...
15	6666	...	...	...	...	...	...	...	...	...	...	...	...
16	6666	...	...	...	...	...	...	...	...	...	...	...	...
17	6666	...	...	...	...	...	...	...	...	...	...	...	...
18	6666	...	...	...	...	...	...	...	...	...	...	...	...
19	6666	...	...	...	...	...	...	...	...	...	...	...	...
20	6666	...	...	...	...	...	...	...	...	...	...	...	...
21	6666	...	...	...	...	...	...	...	...	...	...	...	...
22	6666	...	...	...	...	...	...	...	...	...	...	...	...
23	6666	...	...	...	...	...	...	...	...	...	...	...	...
24	6666	...	...	...	...	...	...	...	...	...	...	...	...
25	6666	...	...	...	...	...	...	...	...	...	...	...	...
26	6666	...	...	...	...	...	...	...	...	...	...	...	...
27	6666	...	...	...	...	...	...	...	...	...	...	...	...
28	6666	...	...	...	...	...	...	...	...	...	...	...	...
29	6666	...	...	...	...	...	...	...	...	...	...	...	...
30	6666	...	...	...	...	...	...	...	...	...	...	...	...
31	6666	...	...	...	...	...	...	...	...	...	...	...	...

Month and date	Conditions at the Kannambadi Dam			
1	12	13	14	15
	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir
1	...	...	...	18,620
2	...	...	...	18,535
3	...	...	...	18,451
4	...	...	...	18,363
5	...	...	...	18,271
6	...	...	...	18,171
7	...	...	...	18,083
8	...	...	...	17,995
9	...	...	...	17,901
10	...	...	...	17,801
11	...	...	...	17,697
12	...	...	...	17,592
13	...	...	...	17,478
14	...	...	...	17,364
15	...	...	...	17,250
16	43+37	...	80	17,148
17	43+42	...	85	17,044
18	43+41	...	84	16,939
19	43+45	...	88	16,833
20	43+49	...	92	16,727
21	43+57	...	100	16,619
22	43+45	...	88	16,509
23	43+45	...	88	16,399
24	43+51	...	94	16,287
25	43+57	...	100	16,177
26	43+61	...	104	16,067
27	43+62	...	105	15,955
28	43+71	...	114	15,843
29	43+71	...	114	15,730
30	43+71	...	114	15,616
31	43+71	...	114	55,502

Month and date	Limit of flow allowed at Cauvery Dam
1	16
1	...
2	...
3	...
4	...
5	...
6	...
7	...
8	...
9	...
10	...
11	...
12	...
13	...
14	...
15	...
16	...
17	...
18	...
19	...
20	...
21	...
22	...
23	...
24	...
25	...
26	...
27	...
28	...
29	...
30	...
31	...

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
	a	*b*	*c*	*d*	*e*														
Month and date	Y = Flow at Kannambadi in m.c. ft.	NY = Probable flow at Cauvery Dam N = 2 from June to September N = 3 from October to January	NY − z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	NY − z / c = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ¾ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ¾ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3 − Col. 4 + ¾ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z − Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5 + Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*) + previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
April 1906.																			
1	5	...	...	...	...	...	...	...	...	...	...	...	15,502	...	43+73	...	116	...	
2	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+74	...	117	...	
3	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+74	...	117	...	
4	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+74	...	117	...	
5	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+74	...	117	...	
6	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+75	...	118	...	
7	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+75	...	118	...	
8	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
9	5	...	...	...	...	...	...	...	...	...	...	...	...	...	42+77	...	120	...	
10	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+73	...	116	...	
11	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+75	...	118	...	
12	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+75	...	118	...	
13	36	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
14	35	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
15	21	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	23	...	...	...	...	...	...	...	...	...	...	...	...	...	43+81	...	124	...	
17	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+81	...	124	...	
18	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
19	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
20	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
21	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
22	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
23	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
24	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+77	...	120	...	
25	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
26	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
27	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	11,910	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
		b	*c*	*d*	*e*														
Month and date	Y=Flow at Kannambadi in ...	NY=probable flow at Cauvery Dam N=8 from June to September N=3 from October to January	NY−z=Probable excess over the limit at Cauvery Dam Z=limit in Col. 16	NY−z=Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ⅛ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam=¾ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3−Col. 4+¾ of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z−Col. 5 Z=limit in Col. 16	Resulting flow at Cauvery Dam, Col 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir, *i.e.*, ⅛ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
May 1906.																			
1	...	...	...	...	...	...	...	...	...	...	...	...	11,910	...	43+78	...	121	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+79	...	122	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+78	...	121	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+75	...	118	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+62	...	105	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+46	...	89	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+6	...	49	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+6	...	49	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43+6	...	49	...	
19	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+18	...	61	...	
20	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+18	...	61	...	
21	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+31	...	77	...	
22	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+6	...	49	...	
23	8	...	...	...	...	...	...	...	...	...	...	...	...	...	43+18	...	61	...	
24	7	...	...	...	...	...	...	...	...	...	...	...	...	...	43+34	...	77	...	
25	7	...	...	...	...	...	...	...	...	...	...	...	...	...	43+35	...	78	...	
26	7	...	...	...	...	...	...	...	...	...	...	...	...	...	43+35	...	78	...	
27	7	...	...	...	...	...	...	...	...	...	...	...	...	...	43+35	...	78	...	
28	5	...	...	...	...	...	...	...	...	...	...	...	...	...	43+42	...	85	...	
29	5	...	...	...	...	32	...	32	...	32	...	...	...	...	43+45	...	88	...	
30	5	...	...	...	...	32	...	32	...	32	...	...	...	...	43+45	...	88	...	
31	5		...	...	...	32	...	32	...	32	...	...			43+50	...	93	9,015	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

IRRI. PAPERS

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						16
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	*a* Y = Flow at Kannambadi in m. c. ft.	*b* NY = Probable flow at Cauvery Dam N = ⅝ from June to September N = ⅜ from October to January	*c* NY—z = Probable excess over the limit at Cauvery Dam Z = limit in Col. 16	*d* $\frac{NY-z}{o}$ = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ⅞ of Col. 2 (*c*)	*e* Quantity to be impounded at Kannambadi Dam, Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (*c*) at Cauvery Dam = ⅜ of Col. 2 (*c*)	Net flow at Cauvery Dam, Col. 3—Col. 4+⅜ of surplus at Kannambadi, if any	Compensation water Col. 8, if less than Z or Z—Col. 5 Z = limit in Col. 16	Resulting flow at Cauvery Dam, Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam, above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*c*)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir *i.e.*, ⅞ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of Cols. 11, 12 and 13	Balance in the reservoir	Limit of flow allowed at Cauvery Dam
1	6	...	...	...	...	32	...	32	...	32	...	...	9,015	...	43+57	...	100	...	
2	6	...	...	...	...	44	...	44	...	44	...	...	...	...	43+57	...	100	...	
3	5	...	...	...	...	44	...	44	...	44	...	...	...	...	43+57	...	100	...	
4	6	...	...	...	...	44	...	44	...	44	...	...	...	...	43+47	...	90	...	
5	6	...	...	...	...	38	...	38	...	38	...	...	...	...	43+49	...	92	...	
6	6	...	...	...	...	130	...	130	...	130	...	...	...	...	43+44	...	87	...	
7	48	...	...	...	...	50	...	50	...	50	...	...	...	...	43+41	...	87	...	
8	89	...	...	...	...	50	...	50	...	50	...	...	...	...	43+51	...	94	...	
9	...	...	...	...	...	44	...	44	...	44	...	...	...	...	43+58	...	101	...	450
10	...	...	...	...	...	38	...	38	...	38	...	...	...	...	43+62	...	105	...	
11	...	...	...	...	...	38	...	38	...	38	...	...	...	...	43+66	...	109	...	
12	...	...	...	...	...	44	...	44	...	44	...	...	...	...	43+68	...	111	...	
13	...	...	...	...	...	50	...	50	...	50	...	...	...	...	43+68	...	111	...	
14	...	...	...	...	...	98	...	98	...	98	...	...	...	...	43+72	...	115	...	
15	...	...	...	...	...	200	...	200	...	200	...	...	...	...	43+75	...	118	...	
	172	...	...	...	...	991	...	991	...	994	...	...	...	...	...	...	1,520	...	
16	1	...	...	...	...	158	...	158	...	158	...	...	...	...	152+69	...	221	...	
17	5	...	...	...	...	130	...	130	...	130	...	...	...	...	152+71	...	223	...	
18	4	...	...	...	...	98	...	98	...	98	...	...	...	...	152+71	...	223	...	
19	1	...	...	...	...	66	...	66	...	66	...	...	...	...	152+73	...	225	...	
20	486	...	...	...	...	44	...	44	...	44	...	...	...	...	152+75	...	224	...	
21	853	...	...	...	...	66		66	...	66	...	...	...	...	152+72	...	221	...	
22	3,208	...	...	...	...	354		354	...	354	...	...	...	...	152+72	...	224	...	
23	2,971	...	...	...	...	386	...	386	...	386	...	...	...	...	152	...	152	...	
24	1,708	...	...	...	...	338	...	338	...	338	...	...	...	...	152	...	152	...	
25	573	...	...	...	...	1,314	...	1,314	...	1,314	...	...	...	...	152	...	152	...	1,060
26	477	...	...	...	...	803	...	803	...	803	...	...	...	...	152	...	152	...	
27	459	...	...	...	...	628	...	628	...	628	...	...	...	...	152	...	152	...	
28	316	...	...	...	...	494	...	494	...	494	...	...	...	...	152	...	152	...	
29	209	...	...	...	...	402	...	402	...	402	...	...	...	...	152	...	152	...	
30	165	...	...	...	...	354	...	354	...	354	...	...	...	...	152	...	152	4,715	
	11,402	...	...	...	..	5,745	...	5,745	...	5,745	...	...	...	...	...	...	2,780	..	
	11,574	...	...	...	...	6,739	...	6,739	...	6,739	...	...	...	...	...	...	4,300	...	

June 1906.

LXXVII
(B) 0145536
371

LIMIT OF RULES. TABLE I. 1913.

Month and date		Discharges at Kannambadi in m. c. ft.	Excess over limit or quantity permissible for storage limit = ⅔ × Col. 9 from June to Sept. and ⅓ × Col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses	Discharges at Cauvery Dam	Discharges at Cauvery Dam as affected	Quantity in excess of the limit, running to waste	Deficit in Madras supplies	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
June 1913.	1	157	...	...	539	539	...	...	
	2	110	...	...	618	618	...	...	
	3	124	...	...	286	286	...	...	
	4	118	...	...	172	172	...	...	
	5	132	...	...	517	517	...	...	
	6	146	...	...	786	786	...	...	
	7	120	...	...	561	561	...	...	450
	8	97	...	...	539	539	...	...	
	9	286	5	4	435	431	...	4	
	10	720	439	329	371	42	...	329	
	11	702	421	316	419	103	...	316	
	12	688	407	305	1,123	818	368	...	
	13	1,163	882	661	1,629	968	518	...	
	14	1,438	1,157	868	3,333	2,465	2,015	...	
	15	1,100	819	614	3,459	2,845	2,395	...	
		7,101	4,130	3,097	14,787	...	5,296	649	
	16	712	49	37	2,791	2,754	1,694	...	
	17	578	...	...	1,973	1,973	913	...	
	18	471	...	...	786	786	...	...	
	19	330	...	...	698	698	...	...	
	20	315	...	...	595	595	...	...	
	21	262	...	...	495	495	...	...	
	22	214	...	...	435	435	...	...	
	23	122	...	...	387	387	...	...	1,060
	24	100	...	...	355	355	...	...	
	25	128	...	...	323	323	...	...	
	26	303	...	...	307	307	...	...	
	27	248	...	...	307	307	...	...	
	28	472	...	...	273	273	...	...	
	29	996	333	250	355	105	...	250	
	30	569	...	...	355	355	...	...	
		5,820	382	287	10,435	...	2,607	250	
		12,921	4,512	3,384	25,222	...	7,903	899	
July 1913.	1	494	...	...	1,243	1,243	...	...	
	2	387	...	...	1,629	1,629	4	...	
	3	444	...	...	1,325	1,325	...	...	
	4	425	...	...	1,563	1,563	...	...	
	5	501	...	...	1,002	1,002	...	...	
	6	757	...	...	732	732	...	...	
	7	627	...	...	840	840	...	...	
	8	576	...	...	948	984	...	...	1,625
	9	498	...	...	786	786	...	...	
	10	530	...	...	698	698	...	...	
	11	636	...	...	663	663	...	...	
	12	674	...	...	840	840	...	...	
	13	586	...	...	732	732	...	...	
	14	584	...	...	698	698	...	...	
	15	541	...	...	948	948	...	...	
		8,260	...	...	14,647	...	4	...	

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ¼ × Col. 9 from June to Sept. and ⅓ × Col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses	Discharges at Cauvery Dam	Discharges at Cauvery Dam as affected	Quantity in excess of the limit, running to waste	Deficit in Madras supplies	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
July 1913.	16	1,616	600	450	4,824	4,374	2,749	...	
	17	5,267	4,251	3,188	14,027	10,839	9,214	...	
	18	8,262	7,246	5,435	12,038	6,603	4,978	...	
	19	8,345	7,329	5,497	11,282	5,785	4,160	...	
	20	7,623	6,607	4,955	10,374	5,419	3,794	...	
	21	5,672	4,656	3,492	7,009	3,507	1,882	...	
	22	3,166	2,150	1,613	4,979	3,366	1,741	...	
	23	1,944	928	696	3,734	3,038	1,413	...	
	24	1,590	574	431	3,010	2,579	954	...	1,625
	25	1,275	259	194	2,165	1,971	346	...	
	26	1,372	356	267	1,899	1,632	7	...	
	27	1,467	451	338	2,095	1,757	132	...	
	28	1,453	437	328	2 095	1,767	142	...	
	29	1,615	599	449	2,235	1,786	161	...	
	30	3,225	2,209	1,657	6,132	4,475	2,850	...	
	31	4,396	3,380	2,535	7,167	4,632	3,007	...	
		58,258	42,032	...	95,115	...	37,530	...	
		66,518	42,032	...	109,762	...	37,534	...	
August 1913.	1	4,786	3,770	2,828	7,287	4,459	2,834	...	
	2	4,981	3,965	2,974	7,167	4,187	2,562	...	
	3	5,125	4,109	3,082	5,663	2,581	956	...	
	4	4,472	3,456	2,592	5,883	3,291	1,666	...	
	5	4,235	3,219	2,414	4,877	2,463	838	...	
	6	3,106	2,090	1,568	3,884	3,316	691	...	
	7	2,817	1,801	1,351	4,012	2,661	1,036	...	
	8	2,057	1,041	781	3,526	2,745	1,120	...	1,625
	9	1,997	981	736	2,656	1,820	195	...	
	10	1,691	675	506	2,375	1,869	244	...	
	11	1,331	315	236	2,095	1,859	234	...	
	12	1,212	196	147	1,824	1,677	52	...	
	13	1,036	20	15	1,629	1,614	...	11	
	14	814	...	...	1,429	1,429	...	...	
	15	744	...	...	1,243	1,243	...	...	
		...	25,638	72,230	...	...	11,428	11	
	16	704	...	...	1,183	1,183	...	...	
	17	643	...	...	1,123	1,123	...	...	
	18	599	...	...	1,002	1,002	...	...	
	19	674	...	...	894	894	...	...	
	20	618	...	...	894	894	...	...	
	21	675	...	...	840	840	...	...	
	22	670	...	...	1,002	1,002	...	...	
	23	992	...	...	1,063	1,063	...	...	
	24	1,216	200	150	1,563	1,413	...	150	
	25	1,133	117	88	1,563	1,475	...	88	
	26	1,307	291	218	1,325	1,107	...	218	1,625
	27	1,140	124	93	1,629	1,536	...	89	
	28	892	...	...	1,429	1,429	...	...	
	29	802	...	...	1,123	1,123	...	...	
	30	934	...	...	1,002	1,002	...	...	
	31	809	...	...	1,123	1,123	...	...	
		...	732	549	...	...	...	545	
		...	26,370	72,779	...	...	11,428	556	

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = ⅔ × Col. 9 from June to Sept. and ½ × Col. 9 from Oct. to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses	Discharges at Cauvery Dam	Discharges at Cauvery Dam as affected	Quantity in excess of the limit, running to waste	Deficit in Madras supplies	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
September 1913.	1	758	...	...	1,002	1,002	...	...	
	2	874	...	...	894	894	...	...	
	3	946	...	...	1,123	1,123	...	...	
	4	910	...	...	1,429	1,429	...	...	
	5	863	...	...	1,303	1,303	...	...	
	6	785	...	...	1,063	1,063	...	...	
	7	687	...	...	948	948	...	...	
	8	671	...	...	840	840	...	...	1,625
	9	500	...	...	664	664	...	...	
	10	448	...	...	629	629	...	...	
	11	394	...	...	562	562	...	...	
	12	357	...	...	518	518	...	...	
	13	293	...	...	473	473	...	...	
	14	222	...	...	451	451	..	...	
	15	296	...	...	419	419	...	...	
		...	...	...	..	...	...	...	
	16	268	...	...	419	419	...	...	
	17	253	...	...	419	419	...	...	
	18	255	...	...	451	451	...	...	
	19	255	...	...	451	451	...	...	
	20	287	...	.	1,498	1,498	378	...	
	21	320	...	...	1,183	1,183	63	...	1,120
	22	316	...	...	732	732	...	...	
	23	318	...	...	1,063	1,063	...	...	
	24	284	...	...	1,243	1,243	123	...	
	25	446	...	...	1,325	1,325	205	...	
	26	415	...	...	4,796	4,796	3,676	...	
	27	571	...	...	2,759	2,759	1,639	...	
	28	361	...	...	1,824	...	704	...	
	29	600	...	..	1,954	...	834	...	
	30	675	...	...	2,408	...	1,288	...	
		...	...	...	...	...	8,910	...	
		...	...	...	..	...	8,910	...	
October 1913.	1	638	225	169	2,504	2,335	1,095	...	
	2	673	260	195	2,923	2,728	1,488	...	
	3	634	221	166	3,901	3,735	2,495	...	
	4	714	301	226	2,432	2,206	966	...	
	5	704	291	218	3,368	3,150	1,910	...	
	6	632	219	164	2,483	2,319	1,079	...	
	7	845	432	324	2,305	1,981	741	...	
	8	979	566	425	2,746	2,321	1,081	...	
	9	804	391	293	2,165	1,862	622	...	
	10	692	279	209	1,967	1,758	518	...	
	11	503	90	68	1,303	1,235	...	5	1,240
	12	529	116	87	1,629	1,532	292	...	
	13	1,107	694	521	4,193	3,672	2,432	...	
	14	3,220	2,807	2,105	6,396	4,291	3,051	...	
	15	3,373	2,960	2,220	5,615	3,395	2,155	...	
		...	9,852	...	...	...	18,925	...	

Month and date		Discharges at Kannambadi in m.c.ft.	Excess over limit or quantity permissible for storage limit = $\frac{1}{4}$ × Col. 9 from June to Sept. and $\frac{1}{3}$ × Col. 9 from Oct to January	Equivalent of column 3 at Cauvery Dam allowing for transmission losses	Discharges at Cauvery Dam	Discharge at Cauvery Dam as affected	Quantity in excess of the limit running to waste	Deficit in Madras supplies	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9
October 1913.	16	2,301	1,888	1,416	4,555	3,139	1,899	...	
	17	1,299	886	664	3,332	2,668	1,428	...	
	18	1,005	592	444	2,095	1,651	411	...	
	19	775	362	272	1,694	1,422	182	...	
	20	620	207	155	1,429	1,274	34	...	
	21	...	...	...	...	...	...	...	
	22	...	...	...	...	...	...	...	
	23	...	...	...	...	...	...	...	
	24	...	...	...	...	...	...	...	1,240
	25	...	...	...	...	...	...	...	
	26	...	...	...	...	...	...	...	
	27	...	...	...	...	...	...	...	
	28	...	...	...	...	...	...	...	
	29	...	...	...	...	...	...	...	
	30	...	...	...	...	...	...	...	
	31	...	...	...	...	...	...	...	
		...	3,935	...	...	...	3,954	...	
		...	13,787	...	...	...	22,879	5	

LIMIT OF RULES. TABLE II. 1913.

Month and date	X = Discharges at Cauvery Dam	X-Z = Surplussing to waste Z = Col. (10)	$\frac{X-Z}{C}$ = Equivalent of column (3) at Kannambadi Dam C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column (6) at Cauvery Dam *i.e.*, $\frac{3}{4}$ of Col. (6)	Cauvery Dam discharges as affected *i.e.*, Col. (3)—Col. (7)	Quantity running to waste, at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1	2	3	4	5	6	7	8	9	10
June 1913. 1	539	89	119	157	119	89	450	...	450
2	618	168	224	110	110	83	535	85	
3	286	...	...	124	...	...	286	...	
4	172	...	...	118	...	172	172	...	
5	517	67	89	132	89	67	450	...	
6	786	336	448	146	146	110	676	226	
7	561	111	148	120	120	90	471	21	
8	539	89	119	97	97	73	466	16	
9	435	...	...	286	...	...	435	...	
10	371	...	...	720	...	...	371	...	
11	419	...	...	702	...	...	419	...	
12	1,123	673	897	688	688	516	607	157	
13	1,629	1,179	1,572	1,163	1,163	179	872	422	
14	3,333	2,883	3,844	1,438	1,438	1,079	1,254	804	
15	3,459	3,009	4,012	1,100	1,100	825	2,634	2,184	
	14,787	8,554	11,472	7,101	5,070	...	...	3,915	
16	2,791	1,731	2,308	712	712	534	2,257	1,197	
17	1,973	913	1,217	578	578	434	1,539	1,479	
18	786	...	...	471	...	...	786	...	
19	698	...	...	330	...	...	698	...	
20	595	...	...	315	...	...	595	...	
21	495	...	...	262	...	...	495	...	
22	435	...	...	214	...	...	435	...	1,060
23	387	...	...	122	...	...	387	...	
24	355	...	...	100	...	...	355	...	
25	323	...	...	128	...	...	323	...	
26	307	...	...	303	...	...	307	...	
27	307	...	...	248	...	...	307	...	
28	273	...	...	472	...	...	273	...	
29	355	...	...	996	...	...	355	...	
30	355	...	...	569	...		355		
	10,435	2,644	3,525	5,820	1,290	...	...	2,676	
	25,222	11,198	14,997	12,921	6,360	...	...	6,591	
July 1913. 1	1,243	...	...	494	...	...	1,243	...	
2	1,629	4	5	387	5	4	1,625	...	
3	1,325	...	...	444	...	...	1,325	...	
4	1,563	...	...	425	...	...	1,563	...	
5	1,002	...	...	501	...	...	1,002	...	
6	732	...	...	757	...	...	732	...	1,625
7	840	...	...	627	...	...	840	...	
8	948	...	...	576	...	...	948	...	
9	786	...	...	498	...	...	786	...	
10	698	...	...	530	...	...	698	...	
11	663	...	...	636	...	...	663	...	
12	840	...	...	674	...	...	840	...	
13	732	...	...	586	...	...	732	...	
14	698	...	...	584	...	...	698	...	
15	948	...	...	541	...	...	948	...	
	14,647	...	...	8,260	...	...	...	...	

Month and date		X = Discharges at Cauvery Dam	X-Z = Surplussing to waste Z = Col. (10)	$\frac{X-Z}{C}$ = Equivalent of column (3) at Kannambadi Dam C = $\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column (6) at Cauvery Dam *i.e.*, $\frac{4}{3}$ of Col. (6)	Cauvery Dam discharges as affected *i.e.*, Col. (3) – Col. (7)	Quantity running to waste at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
July 1913.	16	4,824	3,199	4,265	1,616	1,616	1,212	3,612	1,987	
	17	14,027	12,402	16,556	5,267	5,267	4,950	9,077	7,452	
	18	12,038	10,413	13,884	8,262	8,262	6,197	5,841	4,216	
	19	11,282	9,657	12,876	8,345	8,345	6,259	5,023	3,398	
	20	10,374	9,318	12,424	7,623	7,623	5,717	4,657	3,032	
	21	7,009	5,384	7,179	5,672	5,672	4,254	2,775	1,150	1,625
	22	4,979	3,354	4,472	3,166	3,166	2,375	2,604	979	
	23	3,734	2,109	2,812	1,944	1,944	1,458	2,276	651	
	24	3,010	1,385	1,847	1,590	1,590	1,193	1,817	192	
	25	2,165	540	720	1,275	720	540	1,625	...	
	26	1,899	264	352	1,372	352	264	1,625	...	
	27	2,095	470	627	1,467	627	470	1,625	...	
	28	2,095	470	627	1,453	627	470	1,625	...	
	29	2,235	610	813	1,615	813	610	1,625	...	
	30	6,132	4,507	6,009	3,225	3,225	2,419	3,773	2,088	
	31	7,167	5,542	7,389	4,396	4,396	3,297	3,870	2,245	
		95,074	69,624	...	58,288	54,245	...	...	27,390	
		109,721	69,628	...	66,548	54,250	...	...	27,390	
August 1913.	1	7,287	5,662	7,749	4,786	4,786	3,590	3,697	2,097	
	2	7,167	5,542	7,389	4,981	4,981	3,736	3,431	1,806	
	3	5,663	4,038	5,384	5,125	5,125	3,844	1,819	194	
	4	5,883	4,258	5,477	4,472	4,472	3,354	2,529	904	
	5	4,877	3,252	4,336	4,235	4,235	3,176	1,701	76	1,625
	6	3,884	2,259	3,012	3,106	3,012	2,259	1,625	...	
	7	4,012	2,387	3,183	2,817	2,817	2,113	1,899	274	
	8	3,526	1,901	2,535	2,057	2,057	1,543	1,983	358	
	9	2,656	1,031	1,267	1,997	1,267	1,031	1,625	...	
	10	2,375	750	1,000	1,691	1,000	750	1,625	...	
	11	2,095	470	627	1,331	627	470	1,625	...	
	12	1,824	199	265	1,212	265	199	1,625	...	
	13	1,629	4	5	1,036	5	4	1,625	...	
	14	1,429	...	...	814	...	...	1,429	...	
	15	1,243	...	...	744	...	...	1,243	...	
		55,550	31,753	42,229	40,404	34,649	...	...	5,709	
	16	1,183	...	...	704	...	...	1,183	...	
	17	1,123	...	...	643	...	...	1,123	...	
	18	1,002	...	...	599	...	...	1,002	...	
	19	894	...	...	674	...	...	894	...	
	20	894	...	...	618	...	...	894	...	
	21	840	...	...	675	...	...	840	...	1,625
	22	1,002	...	...	670	...	...	1,002	...	
	23	1,063	...	...	992	...	...	1,063	...	
	24	1,563	...	...	1,216	...	...	1,563	...	
	25	1,563	...	...	1,133	...	...	1,563	...	
	26	1,325	...	...	1,307	...	...	1,325	...	
	27	1,629	4	5	1,140	5	4	1,625	...	
	28	1,429	...	...	892	...	...	1,429	...	
	29	1,123	...	...	802	...	...	1,123	...	
	30	1,002	...	...	934	...	...	1,002	...	
	31	1,123	...	...	809	...	...	1,123	...	
		18,758	4	...	13,808	5	...	...	...	
		74,308	31,758	..	54,212	34,654	...	...	5,709	

Month and date	X = Discharges at Cauvery Dam	X-Z = Surplussing to waste Z = Col. (10)	$\frac{X-Z}{C}$ = Equivalent of column (3) at Kannambadi Dam C = ¾	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column (6) at Cauvery Dam *i.e.*, ¾ of Col. (6)	Cauvery Dam discharges as affected *i.e.*, Col. (3) – Col. (7)	Quantity running to waste, at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1	2	3	4	5	6	7	8	9	10
September 1913.									
1	1,002	...	...	758	...	...	1,002	...	
2	894	...	...	874	...	...	894	...	
3	1,123	...	...	946	...	...	1,123	...	
4	1,429	...	...	910	...	...	1,429	...	
5	1,303	...	...	863	...	...	1,303	...	
6	1,063	...	...	785	...	...	1,063	...	
7	948	...	...	687	...	...	948	...	
8	840	...	...	671	...	...	840	...	1,625
9	664	...	...	500	...	...	664	...	
10	629	...	...	448	...	...	629	...	
11	562	...	...	394	...	...	562	...	
12	518	...	...	357	...	...	518	...	
13	473	...	...	293	...	...	473	...	
14	451	...	...	222	...	...	451	...	
15	419	...	...	296	...	...	419	...	
	12,318	...	...	9,004	...	...	12,313	...	
16	419	...	...	268	...	...	419	...	
17	419	...	...	253	...	...	419	...	
18	451	...	...	255	...	...	451	...	
19	451	...	...	255	...	...	451	...	
20	1,498	378	504	287	287	215	1,283	...	
21	1,183	63	84	320	84	63	1,120	...	1,120
22	732	...	...	316	...	...	732	...	
23	1,063	...	...	318	...	...	1,063	...	
24	1,243	123	154	284	154	123	1,120	...	
25	1,325	205	273	446	273	205	1,120	...	
26	4,796	3,676	4,901	415	415	311	4,485	3,365	
27	2,759	1,639	2,185	571	571	428	2,331	1,211	
28	1,824	704	939	361	361	271	1,553	433	
29	1,954	834	1,112	600	600	450	1,504	384	
30	2,408	1,288	1,717	675	675	506	1,902	782	
	16,339	8,910	11,869	5,624	3,420	...	...	6,175	
	28,657	...	11,869	14,624	3,420	...	...	6,175	
October 1913.									
1	2,504	1,264	1,685	638	638	479	2,025	785	
2	2,923	1,683	2,244	673	673	505	2,418	1,178	
3	3,901	2,661	3,548	634	634	476	3,425	2,185	
4	2,432	1,192	1,589	714	714	536	1,896	656	
5	3,368	2,128	2,838	704	704	528	2,840	1,600	
6	2,483	1,243	1,657	635	635	474	2,009	769	1,240
7	2,305	1,065	1,420	845	845	634	1,671	431	
8	2,746	1,506	2,008	979	979	734	2,012	772	
9	2,165	925	1,233	804	804	603	1,562	322	
10	1,967	727	969	692	692	519	1,448	208	
11	1,303	63	84	503	84	63	1,240	...	
12	1,629	389	519	529	519	389	1,240	...	
13	4,193	2,953	3,937	1,107	1,107	830	3,363	2,123	
14	6,396	5,156	6,875	3,220	3,220	2,415	3,981	2,741	
15	5,615	4,375	5,833	3,373	3,373	2,530	3,085	1,845	
	...	27,330	...	...	15,618	...	...	15,615	

Month and date		X = Discharges at Cauvery Dam	X-Z = Surplussing to waste Z = Col. (10)	$\frac{X-Z}{C}$ = Equivalent of column (3) at Kannambadi Dam $6=\frac{3}{4}$	Y = Discharges at Kannambadi Dam	Storage at Kannambadi	Equivalent of column (6) at Cauvery Dam *i.e.*, $\frac{3}{4}$ of Col. (6)	Cauvery Dam discharges as affected *i.e.*, Col. (3)—Col. (7)	Quantity running to waste, at Cauvery Dam after storage at Kannambadi	Limit of flow allowed at Cauvery Dam
1		2	3	4	5	6	7	8	9	10
October 1913.	16	4,555	3,315	4,420	2,301	2,301	1,726	2,829	1,589	1,240
	17	3,332	2,092	2,789	1,299	1,299	974	2,358	1,118	
	18	2,095	855	1,140	1,055	1,055	791	1,304	64	
	19	1,694	454	605	775	605	454	1,240	...	
	20	1,429	189	252	620	252	187	1,240	...	
	21	...	...	...	...	...	...	...	...	
	22	...	...	...	...	...	...	...	...	
	23	...	...	...	...	...	...	...	...	
	24	...	...	...	...	...	...	...	...	
	25	...	...	...	...	...	...	...	...	
	26	...	...	...	...	...	...	...	...	
	27	...	...	...	...	...	...	...	...	
	28	...	...	...	...	...	...	...	...	
	29	...	...	...	...	...	...	...	...	
	30	...	...	..	...	...	...	...	...	
	31	...	...	...	...	...	...	...	...	
		...	6,905	...	...	5,512	...	...	2,771	
		...	34,235	...	...	21,130	...	...	18,386	

Month and date		Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						Limit of flow allowed at Cauvery Dam
		2					3	4	5	6	7	8	9	10	11	12	13	14	15	
		a	*b*	*c*	*d*	*e*														
		Y = Flow at Kannambadi in m.c.ft.	NY = Probable flow at Cauvery Dam. N = 4 from June to September N=3 from October to January	NY-Z = Probable excess over the limit at Cauvery Dam. Z = Col. 16.	NY-Z/c = Value of Col. 2 (*c*) at Kannambadi Dam, *i.e.*, ¼ of Col. 2 (*c*)	Quantity to be impounded at Kannambadi Dam. Col. 2 (*d*) or 2 (*a*) whichever is less	Flow at the Cauvery Dam in m.c.ft. 3 days later	Value of Col. 2 (*e*) at Cauvery Dam = ¼ of Col. 2 (*e*)	Net flow at Cauvery Dam Col. 3—Col. 4 + ¼ of surplus at Kannambadi, if any	Compensation water. Col. 3, if less than Z or Z—Col. 5. Z = limit in Col. 16.	Resulting flow at Cauvery Dam. Col. 5+ Col. 6, three days previous	Quantity running to waste at Cauvery Dam above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (*e*) + previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir. ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of columns 11, 12 and 13	Balance in the reservoir	
June 1913.	1	157	...	...	...	...	539	...	539	...	539	89	...	...	...	43	...	43	...	
	2	110	...	...	...	...	618	...	618	...	618	168	...	...	...	43	...	43	...	
	3	121	...	...	...	...	286	...	286	...	286	...	...	...	...	43	...	43	...	
	4	118	...	...	...	...	172	...	172	...	172	...	...	...	...	43	...	43	...	
	5	132	...	...	...	...	517	...	517	...	517	67	...	...	...	43	...	43	...	
	6	146	...	...	...	...	786	...	786	...	786	336	...	...	...	43	...	43	...	
	7	120	...	...	...	...	561	...	561	...	561	111	...	...	...	43	...	43	...	
	8	97	...	...	...	...	539	...	539	...	539	89	...	...	...	43	...	43	9,656	450
	9	286	458	8	11	11	435	8	427	8	427	...	...	9,667	...	43	...	43	9,621†	
	10	720	1,152	702	936	720	371	540	—169*	371	—169	...	...	10,341	...	43	...	43	10,298	
	11	702	1,123	673	897	702	419	526	—107*	419	—107	...	...	11,000	...	43	...	43	10,957	
	12	688	1,101	651	868	685	1,123	516	607	...	615	165	8	11,645	11	43	...	51	11,594	
	13	1,163	1,861	1,411	1,881	1,163	1,629	871	758	...	1,129	679	371	12,757	495	43	...	538	12,219	
	14	1,438	2,301	1,851	2,201	1,438	3,333	1,078	2,255	...	2,674	2,224	419	13,657	559	43	...	602	13,055	
	15	1,100	1,760	1,310	1,747	1,100	3,459	825	2,631	...	2,634	2,184	..	14,155	...	43	..	43	14,112	
		...	..	...	...	5,822	...	...	...	796	.	6,112	796	...	1,062	...	...	1,707	...	
	16	712	1,139	79	105	105	2,791	79	2,712	...	2,712	1,652	...	14,227	...	152	...	152	14,075	
	17	578	...	...	...	...	1,973	...	1,973	..	1,973	913	...	...	...	152	...	152	13,923	
	18	471	...	...	...	...	786	...	786	...	786	...	...	...	...	152	...	152	13,771	
	19	330	...	...	...	...	698	...	698	..	698	...	...	...	...	152	...	152	13,619	
	20	315	...	...	...	...	595	...	595	...	595	...	...	...	...	152	...	152	13,467	
	21	262	...	..	...	...	495	...	495	...	495	...	...	...	...	152	...	152	13,315	
	22	214	...	...	...	...	435	...	435	...	435	...	...	...	...	152	...	152	13,163	
	23	122	...	...	...	...	387	..	387	...	387	...	...	...	...	152	...	152	13,011	1,060
	24	100	...	...	...	...	355	...	355	...	355	...	...	...	...	152	...	152	12,859	
	25	128	...	...	...	...	323	...	323	...	323	...	...	...	...	152	...	152	12,707	
	26	303	...	...	...	...	307	...	307	...	307	...	...	...	...	152	...	152	12,555	
	27	248	...	...	...	...	307	...	307	...	307	...	...	...	...	152	...	152	12,403	
	28	472	...	...	...	...	273	...	273	...	273	...	...	...	...	152	...	152	12,251	
	29	996	1,594	534	712	712	355	534	—179*	355	—179	...	...	12,963	...	152	...	152	12,811	
	30	569	...	...	...	...	355	...	355	...	355	...	...	12,811	...	152	..	152	12,659	
		...	...	...	...	817	...	...	...	355	...	2,565	...	...	...	...	...	2,280	...	
		...	...	...	...	6,636	...	...	...	1,151	...	8,677	796	...	1,062	...	...	...	...	

* When net flow in Col. (5) is negative, compensation is given for the actual discharge in Col. (3).
† From the 9th June to 19th July inclusive add 3 to each of the figures in Col. 15.

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						Limit of flow allowed at Cauvery Dam (Z)
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	*a* Y = Flow at Kannambadi in m.c.ft.	*b* NY = Probable flow at Cauvery Dam, N = 5 from June to September, N = 3 in October to January	*c* NY—Z = Probably excess over the limit at Cauvery Dam. Z = Col. 16	*d* $\frac{NY-Z}{c}$ = Value of Col. 2 (c) at Kannambadi Dam. *i.e.*, $\frac{1}{4}$ of Col. 2 (c)	*e* Quantity to be impounded at Kannambadi Dam. Col. 2 (d) or 2 (a) whichever is less	Flow at the Cauvery Dam in m.c.ft. 3 days later	Value of Col. 2 (c) at Cauvery Dam = $\frac{3}{4}$ of Col. 2 (c)	Net flow at Cauvery Dam Col. 3—Col. 4 + surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5. Z = limit in Col. 16	Resulting flow at Cauvery Dam. Col. 5 + Col. 6, three days previous	Quantity running to waste at Cauvery Dam above limit	Quantity running to waste out of compensation water	Gross storage in the Reservoir, Col. (c) + previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir $\frac{4}{3}$ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of columns, 11, 12 and 13	Balance in the reservoir	
July 1913.																			
1	491	...	...	...	...	1,243	...	1,243	...	1,243	...	...	...	...	156	...	156	12,503	
2	387	...	...	...	...	1,629	...	1,629	...	1,981	359	355	...	473	156	...	629	11,874	
3	441	...	...	...	...	1,325	...	1,325	...	1,325	...	...	...	...	156	...	156	11,718	
4	425	...	...	...	...	1,563	...	1,563	...	1,563	...	...	...	...	156	...	156	11,562	
5	501	...	...	...	...	1,002	...	1,002	...	1,002	...	...	...	...	156	...	156	11,406	
6	757	...	...	...	...	732	...	732	...	732	...	...	...	...	156	...	156	11,250	
7	627	...	...	...	...	840	...	840	...	840	...	...	...	...	156	...	156	11,094	
8	576	...	...	...	...	948	...	948	...	948	...	...	...	...	156	...	156	10,938	
9	198	...	...	...	...	786	...	786	...	786	...	...	...	...	156	...	156	10,782	1,625
10	530	...	...	...	...	698	...	698	...	698	...	...	...	...	156	...	156	10,626	
11	636	...	...	...	...	663	...	663	...	663	...	...	...	...	156	...	156	10,470	
12	674	...	...	...	...	840	...	840	...	840	...	...	...	...	156	...	156	10,314	
13	586	...	..	..	...	732	...	732	...	732	...	...	...	...	156	...	156	10,158	
14	584	...	...	...	...	698	...	698	...	698	...	...	...	...	156	...	156	10,002	
15	541	...	...	...	...	948	...	948	...	948	...	...	...	...	156		156	9,846	
	...	...	...	...	...	...	...	...	...	...	359	355	...	473	...	...	2,813	...	
16	1,616	2,586	961	1,281	1,281	4,824	961	3,863	...	3,863	2,238	...	11,127	...	156	...	156	10,971	
17	5,267	8,427	6,802	9,069	5,267	14,027	3 950	10,077	..	10,077	8,452	...	16,238	...	156	...	156	16,082	
18	8,262	13,219	11,594	15,459	8,262	12,038	6,196	5,842	...	5,842	4,217	...	24,344	...	156	...	156	24,188	
19	8,345	13,352	11,727	15,636	8,345	11,282	6.259	5,023	...	5,023	3,398	...	32,533	...	156	...	156	32,377	
20	7,623	12,197	10,572	14,096	7,623	10,374	5,717	6,730	...	6,730	5.105	...	40,003	...	156	2,767	7,623	37,080	
21	5,672	9.075	7.450	7,563	5,672	7,009	1,251	7,009	...	7,009	5,381	...	42,752	...	156	5,516	5,672	37,080	
22	3,166	5,066	3,441	4,588	3,166	4,979	2,374	4,979	...	4,979	3,351	..	40.246	...	156	3,010	3,166	37,080	
23	1.944	3,110	1,485	1,980	1,944	3,734	1,458	3,734	...	3,731	2,109	...	39.024	...	156	1,788	1.944	37,080	
24	1,690	2,544	919	1,225	1,225	3,010	919	2,893	...	2,893	1,268	...	38,305	...	156	1,069	1.225	37,080	1,625
25	1,275	2.040	415	553	553	2.165	415	2,048	..	2,048	423	...	37,643	...	156	397	553	37,080	
26	1,372	2,195	570	760	760	1,899	570	1,772	...	1,772	117	...	38,452	...	156	604	760	37,080	
27	1,467	2,347	722	963	963	2,095	722	1,978	...	1,978	353	...	38,547	...	156	807	963	37,080	
28	1,453	2,325	700	933	933	2,095	700	1,978	...	1,978	353	...	38,533	...	156	777	933	37,080	
29	1,615	2,584	959	1,279	1,279	2,235	959	2,118	...	2,118	493	...	38,695	...	156	1,123	1,279	37,080	
30	3,225	5,160	3,535	4,713	3,225	6,132	2,419	6,015	...	6,015	4,390	...	40,305	...	156	3,069	3,225	37,080	
31	4,396	7,034	5,409	7,212	4,396	7,167	3,297	7,050	...	7,050	5,425	...	41.176	...	156	4,240	4,396	37,080	
	...	...	...	...	54,894	...	...	...	...	...	47,109	...	. .	...	...	25,164	32,368	...	
	...	...	...	...	54,894	...	...	...	...	...	47,468	355	...	473	...	25,164	...	...	

Month and date	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						Limit of flow allowed at Cauvery Dam (Z)
	1	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
		a	b	c	d	e														
		Y = Flow at Kannabadi in m.c.ft.	NY = Probable flow at Cauvery Dam, N = 5 from June to September, N = 3 in October to January	NY—Z = Probable excess over the limit at Cauvery Dam, Z = Col. 16	$\frac{NY-Z}{c}$ = Value of Col. 2 (c) at Kannambadi Dam, *i.e.*, $\frac{5}{4}$ of Col. 2 (c)	Quantity to be impounded at Kannambadi Dam. Col. 2 (d) or 2 (a) whichever is less	Flow at the Cauvery Dam in m.c.ft. 3 days later	Value of Col. 2 (c) at Cauvery Dam = $\frac{3}{4}$ of Col. 2 (c)	Net flow at Cauvery Dam Col. 3—Col. 4+1 of surplus at Kannambadi, if any	Compensation water, Col. 3, if less than Z or Z—Col. 5, Z = limit in Col. 16	Resulting flow at Cauvery Dam Col. 5+Col. 6, three days previous	Quantity running to waste at Cauvery Dam above limit	Quantity running to waste out of compensation water	Gross storage in the Reservoir, Col. (e)+previous days' balance in Col. 15	Compensation water converted to Kannambadi Reservoir 4 of Col. 6	Draw-off for Irrigation, etc.	Surplus when the reservoir is full	Total of columns, 11, 12 and 13	Balance in the reservoir	
August 1913.	1	4,786	7,658	6.033	8,044	4,786	7,287	3,589	7,170	...	7,170	5,545	...	41,866	...	156	4,630	4,786	37,080	
	2	4,981	7,970	6.345	8,460	4,981	7,167	3,736	7,050	...	7,050	5,425	...	42.061	...	156	4,825	4,981	37,080	
	3	5,125	8.200	7,575	10,100	5,125	5.663	3,844	5,536	...	5,586	4,911	...	42,205	...	156	4,969	5,125	37,080	
	4	4.472	7,155	5.630	7.507	4,472	5.883	3,354	5.883	...	5,883	4,258	...	41.552	...	156	4,316	4,472	37,080	
	5	4,235	6.776	5,151	6,868	4,235	4,877	3,176	4,760	...	1.760	3,135	...	41,315	...	156	4,079	4,235	37,080	
	6	3,106	4,970	3.345	4,460	3.106	3.884	2,329	3,767	...	3,767	2,142	..	40,186	...	156	2,950	3,106	37.080	
	7	2,817	4,507	3,882	5.176	2,817	4,012	2,113	3,895	...	3,895	2,270	...	39,897	...	156	2,661	2,817	37,080	
	8	2,057	3,291	1.666	2,221	2,057	3,526	1,543	3,409	...	3,409	1,784	...	39,137	...	156	1,901	2,057	37.080	1,625
	9	1,997	3,195	1,570	2,093	1,997	2,656	1,198	7,539	...	7.539	5,914	...	39,077	...	156	1,841	1,997	37,080	
	10	1,691	2,706	1,081	1,441	1,441	2,375	1,681	2,253	...	2,253	628	...	38,521	...	156	1,285	1,441	37,080	
	11	1,331	2,130	505	673	673	2,095	505	1,978	...	1,978	353	...	37,753	...	156	517	673	37,080	
	12	1,212	1,939	314	419	419	1.824	311	1,707	...	1.707	82	...	37,499	...	156	263	419	37,080	
	13	1,036	1,658	33	44	44	1,629	33	1,596	29	1,596	...	...	37,124	...	156	...	156	36,968	
	14	814	...	...	...	...	1,429	...	1,429	...	1,429	...	...	...	...	156	...	156	36,812	
	15	744	...	...	...	...	1,243	...	1,243	...	1,243	...	...	...	...	156	...	156	36,656	
		...	...	...	...	36,153	...	...	...	29	...	36,447	...	...	...	...	34,237	36,577	...	
	16	701	...	...	...	...	1,183	...	1,183	...	1,212	...	...	...	39	156	...	195	36,461	
	17	643	...	...	...	...	1,123	...	1,123	...	1,123	...	...	...	...	156	...	156	36,305	
	18	599	...	...	...	...	1,002	...	1,002	...	1,002	...	...	...	...	156	...	156	36,149	
	19	674	...	...	...	...	894	...	894	..	894	...	...	...	...	156	...	156	35,993	
	20	618	...	...	...	...	894	...	894	...	894	...	...	...	...	156	..	156	35,837	
	21	675	...	...	...	...	840	...	840	...	840	...	...	...	..	156	...	156	35,681	
	22	670	...	...	...	...	1,002	...	1,002	...	1,002	...	...	...	...	156	...	156	35,525	
	23	992	...	...	...	...	1,063	...	1,063	...	1,063	...	...	...	..	156	...	156	35,369	
	24	1,216	1,946	321	428	428	1,563	321	1,242	321	1,242	...	...	35,797	...	156	...	156	35,611	
	25	1,133	1,813	188	251	251	1,563	188	1,375	188	1,375	..	...	35,892	...	156	...	156	35,736	1,625
	26	1,307	2,091	466	621	621	1,325	466	859	466	859	...	...	36,357	...	156	...	156	36,201	
	27	1,140	1,824	199	265	265	1.629	199	1,430	199	1,751	126	126	36,466	428	156	..	584	35,882	
	28	892	...	...	...	...	1.429	...	1,429	...	1,617	...	...	...	251	156	...	407	35,475	
	28	802	...	...	...	...	1,123	...	1,123	...	1,589	...	...	...	621	159	...	777	34,698	
	30	934	...	...	...	...	1,002	...	1,002	...	1,201	...	...	...	260	156	...	416	34,282	
	31	809	...	...	...	...	1,123	...	1,123	...	1,123	...	...	...	...	156	...	156	34,126	
		...	...	...	...	1,565	...	...	...	1,170	...	126	126	...	1,599	...	...	4,095	...	
		...	...	...	...	37,718	...	...	...	1,199	..	36,573	126	...	1,599	...	34,237	40,672	...	

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						Limit of flow allowed at Cauvery Dam (Z)
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	*a*	*b*	*c*	*d*	*e*														
	Y = Flow at Kannambadi in m.c.ft.	N Y = Probable flow at Cauvery Dam N = 5 from June to September N = 3 from October to January	N Z - Z = Probable excess over the limit at Cauvery Dam. Z = Col. 16	$\frac{NY-Z}{c}$ = Value of Col. (c) at Kannambadi Dam, *i.e.*, ¾ of Col 2 (c)	Quantity to be impounded at Kannambadi Dam. Col. 2 (d) or 2 (a) whichever is less	Flow at the Cauvery Dam in m.c.ft. 3 days later	Value of Col. 2 (c) at Cauvery Dam = ¾ of Col. 2 (c)	Net flow at Cauvery Dam Col. 3—Col. 4 + ⅓ of surplus at Kannambadi, if any	Compensation water Col. 3, if less than Z or Z—Col. 6. Z = limit to Col. 16	Resulting flow at Cauvery Dam. Col. 5 + Col. 6, three days previous	Quantity running to waste at Cauvery Dam above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (e) + previous day's balance in Col. 15	Compensation water conversed to Kannambadi Reservoir, ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir in full	Total of columns 11, 12 and 13	Balance in the reservoir	
September 1913.																			
1	758	...	...	...	...	1,002	...	1,002	...	1,002	...	...	...	...	156	...	156	33,970	
2	871	...	...	...	...	894	...	894	...	894	...	...	...	...	156	...	156	33,814	
3	916	...	...	...	...	1,123	...	1,123	...	1,123	...	...	...	...	156	...	156	33,658	
4	910	...	...	...	...	1,429	...	1,429	...	1,429	...	...	...	...	156	...	156	33,502	
5	863	...	...	...	...	1,303	...	1,303	...	1,303	...	...	...	...	156	...	156	33,346	
6	785	...	...	...	...	1,063	...	1,063	...	1,063	...	...	...	...	156	...	156	33,190	
7	687	...	...	...	...	948	...	948	...	948	...	...	...	...	156	...	156	33,034	
8	671	...	...	...	...	840	...	840	...	840	...	...	...	...	156	...	156	32,878	
9	560	...	...	...	...	664	...	664	...	664	...	...	...	...	156	...	156	32,722	1,625
10	448	...	...	...	...	629	...	629	...	629	...	...	...	...	156	...	156	32,566	
11	394	...	...	...	...	562	...	562	...	562	...	...	...	...	156	...	156	32,910	
12	357	...	...	...	...	518	...	518	...	518	...	...	...	...	156	...	156	32,254	
13	293	...	...	...	...	473	...	473	...	473	...	...	...	...	156	...	156	32,093	
14	222	...	...	...	...	451	...	451	...	451	...	...	...	...	156	...	156	31,942	
15	296	...	...	...	...	419	...	419	...	419	...	...	...	...	156	...	156	31,786	
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	268	...	...	...	...	419	...	419	...	419	...	...	...	...	156		156	31,630	
17	253	...	...	...	...	419	...	419	...	419	...	...	...	...	156	...	156	31,474	
18	255	...	...	...	...	451	...	451	...	451	...	...	...	...	156	...	156	31,318	
19	255	...	...	...	...	451	...	451	...	451	...	...	...	...	156	...	156	31,162	
20	287	...	...	...	...	1,498	...	1,498	...	1,498	378	...	...	...	156	...	156	31,006	
21	320	...	...	...	...	1,183	...	1,183	...	1,183	63	...	...	...	156	...	156	30,850	
22	316	...	...	...	...	732	...	732	...	732	...	...	...	...	156	...	156	30,694	
23	318	...	...	...	...	1,063	...	1,063	...	1,063	...	...	...	...	156	...	156	30,538	
24	284	...	...	...	...	1,243	...	1,243	...	1,243	123	...	...	...	156	...	156	30,382	1,120
25	446	...	...	...	...	1,325	...	1,325	...	1,325	205	...	...	...	156	...	156	40,226	
26	415	...	...	...	...	4,796	...	4,796	...	4,796	3,676	...	...	...	156	...	156	30,070	
27	571	...	...	...	...	2,759	...	2,759	...	2,759	1,639	...	...	...	156	...	156	29,914	
28	361	...	...	...	...	..	...	...	...	...	...	...	...	...	156	...	156	29,758	
29	600	...	...	...	...	...	...	...	...	...	...	...	...	...	156	...	156	29,602	
30	675	...	...	...	...	...	...	...	...	...	...	...	...	...	156	...	156	446	
	...	...	...	...	...	...	...	...	...	...	6,084	...	..	...	...	...	...	...	
	...	...	...	...	...	...	...	...	...	...	6,084	...	...	...	...	...	4,680	...	

October 1913.

1	Approximations for quantity to be impounded					Conditions at the Cauvery Dam							Conditions at the Kannambadi Dam						Limit of flow allowed at Cauvery Dam (Z)
	2					3	4	5	6	7	8	9	10	11	12	13	14	15	
Month and date	a	b	c	d	e														
	Y = Flow at Kannambadi in m.c.ft.	N Y = Probable flow at Cauvery Dam, N = 2 from June to September, N = 3 from October to January	N Y − Z = Probable excess over the limit at Cauvery Dam. Z = Col. 16	$\frac{NY-Z}{c}$ = Value of Col. (c) at Kannambadi Dam ¼ of Col. 2 (c)	Quantity to be impounded at Kannambadi Dam Col. 2 (d) or 2 (a) whichever is less	Flow at the Cauvery Dam in m. c. ft. 3 days later	Value of Col. 2 (e) at Cauvery Dam = ¾ of Col. 2 (e)	Net flow at Cauvery Dam Col. = 3—Col. 4 + ¾ of surplus at Kannambadi, if any	Compensation water. Col. 3, if less than Z or Z—Col. 5, Z = limit in Col. 16	Resulting flow at Cauvery Dam Col. 5 + Col. 6, three days previous	Quantity running to waste at Cauvery Dam above limit	Quantity running to waste out of compensation water	Gross storage in the reservoir, Col. 2 (e) + previous days' balance in Col. 16	Compensation water converted to Kannambadi Reservoir ¾ of Col. 6	Draw-off for irrigation, etc.	Surplus when the reservoir is full	Total of columns 11, 12 and 13	Balance in the reservoir	
1	638	1,914	674	899	638	2,504	478	2,426	...	2,426	1,186	...	30,084	...	156	...	156	29,928	
2	673	2,019	779	1,030	673	2,923	505	2,418	...	2,418	1,178	...	30,601	..	156	...	156	30,445	
3	634	1,902	662	883	634	3,901	475	3,426	...	3,426	1,286	...	31,079	...	156	....	156	30,923	
4	714	2,142	902	1,203	714	2,432	535	1,897	...	1,897	657	...	31,637	...	156	...	156	31,481	
5	701	1,212	872	1,163	704	3,368	528	2,840	...	2,840	1,600	...	32,185	...	156	...	156	32,029	
6	632	1,896	656	875	632	2,483	474	2,009	...	2,009	769	...	32,661	...	156	...	156	32,505	
7	845	2,535	1,295	1,727	845	2,305	634	1,576	...	1,671	431	...	33,350	...	156	...	156	33,194	
8	979	2,937	1,697	2,263	979	2,746	734	2,012	...	2,012	772	...	34,173	...	156	...	156	34,017	1,240
9	801	2,412	1,172	1,563	804	2,165	603	1,562	...	1,562	322	...	34,821	...	156	...	156	34,665	
10	692	2,076	836	1,115	692	1,967	519	1,448	...	1,448	208	...	35,357	...	156	...	156	35,201	
11	563	1,509	269	359	359	1,303	269	1,034	206	1,034	...	...	35,560	...	156	...	156	35,404	
12	529	1,587	347	463	463	1,629	347	1,282	...	1,282	42	...	35,867	...	156	...	156	35,711	
13	1,107	3,321	2,081	2,775	1,107	4,193	830	3,363	..	3,363	2,123	...	36,818	...	156	...	156	36,662	
14	3,220	9,660	8,420	11,227	3,220	6,396	2,415	6,485	...	6,485	5,245	206	39,882	275	156	2,371	2,802	37,080	
15	3,373	10,119	8,879	11,839	3,373	5,615	2,530	5,495	...	5,498	4,258	...	40,453	..	156	3,217	3,373	37,080	
	...	...	...	...	15,837	...	...	...	206	...	20,077	...	...	275	...	...	8,203	...	
16	2,301	6,903	5,661	7,548	2,301	4,555	1,726	4,438	...	4,438	3,198	...	39,381	...	156	2,145	2,301	37,080	
17	1,299	3,897	2,557	3,409	1,299	3,332	974	3,215	...	3,215	1,975	...	38,379	...	156	1,143	1,299	37,080	
18	1,005	3,015	1,775	2,367	1,005	2,095	954	1,958	...	1,978	758	...	38,085	...	156	849	1,005	37,080	
19	775	2,325	1,085	1,447	775	1,694	586	1,577	...	1,577	337	...	37,855	...	156	619	775	37,080	
20	620	1,860	620	827	620	1,429	465	1,312	...	1,312	72	...	37,700	...	156	464	620	37,080	
21	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,240
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	...	...	...	...	6,000	...	...	...	...	...	6,340	...	...	...	...	...	6,000	...	
	...	...	...	...	21,837	...	...	...	206	...	26,417	...	...	275	...	...	14,203	...	

Exhibit Ma. 11.

MADRAS REJOINDER.

PART V.—LEGAL ARGUMENTS.

Rejoinder to the Memorandum presented by Mysore on the 6th of November 1913.

The Madras Government note with satisfaction that Mysore now admits that the Agreement of 1892 was the outcome of the desire of the Government of India that "the matter should be settled, if possible, by some understanding between Madras and Mysore" and not of any "pressure" to which Mysore had to submit, as insinuated in paragraph 25 of the original Mysore case (My. 1). They are also glad to find that the charges of unfairness, etc., originally put forward by Mysore against the Agreement itself are no longer persisted in. A perusal of the correspondence (printed in Appendix A) that led up to the Agreement will clearly show how unfounded these charges were and how both parties to the Agreement were actuated by the sole desire to see the irrigation resources of the tracts in question used to the best advantage of all concerned without detriment to long-established rights or usage. If, by the last sentence of paragraph 1 of their memorandum, the Mysore Government intend to suggest that in 1889 there was any *change* of attitude on the part of the Madras Government or their officers, this Government must enter their emphatic protest against it. The policy and views of this Government have remained the same from the beginning of the last century as will appear from the correspondence referred to in paragraphs 2 and 3 of Sir K. Seshadri Iyer's letter to the Resident, dated 10th June 1890 (Appendix A to the Mysore memorandum). Nor can this Government accept the correctness of the statement in paragraph 2 of the memorandum that, in the Ootacamund Conference of 1890, "the Madras Government assumed an uncompromising attitude, by stating that every irrigation work in Mysore of any consequence required their previous consent." As will clearly appear from the notes of the Conference (printed as Appendix A hereto) the Madras Government then, as ever, merely insisted on the due protection of their prescriptive rights and it is the Mysore Durbar that took up an extreme attitude by denying any prescriptive rights in Madras and putting forward a claim of *unlimited* natural rights to intercept and use the whole rainfall of the plateau within the Mysore territory; and this is the position also taken up by Sir K. Seshadri Iyer in his memorandum of 10th June 1890.

2. It is difficult to follow the statement in paragraph 3 of the Mysore reply that Sir K. Seshadri Iyer's memoranda of 1890 and 1899 present an "exposition of the Agreement of 1892." As to the memorandum of 1890, it could not possibly have any bearing on the construction of the Agreement of two years later, especially when it is also borne in mind that the Agreement did not accept the claims and principles enunciated by Sir K. Seshadri Iyer in 1890. The note of 1899 cannot be seriously relied on. It was not even communicated, or intended to be communicated, to the Madras Government or to the Government of India, but was meant for the use of his own officers. And, after all, it only contains his *ipse dixit* that the rules of 1892 were "not intended to curtail in any way the rights of the State to utilize the waters within its territorial limits." One cannot help asking, what else were they intended for then? The Mysore Government themselves now admit (see paragraph 10 of the memorandum) that they do not rely on any "unlimited natural right," but Sir K. Seshadri Iyer stuck to that view even in 1899. As to the weight due to his opinion in the matter of the interpretation of the Agreement of 1892, it is only necessary to state (with all respect) that it is no more *relevant* than the opinion of the Madras Government which was the other party to the Agreement.

3. The remarks in paragraph 4 of the memorandum are by no means relevant to the questions at issue. It may, however, be pointed out that, while verbally

disowning the theory of "natural right," the Mysore Durbar practically fall back upon it in a different form in some of their observations in this paragraph. It is put forward as a great grievance that Madras should develop its Cauvery irrigation any further and Mysore therefore desires that steps should be taken immediately to utilize its *natural* advantages to the *fullest extent now possible.* It is forgotten that, the Cauvery being an inter-state river, Madras has as much right to its water as Mysore. As pointed out in the Madras memorandum, prescription is not the basis or source of the rights of Madras, but merely a criterion agreed upon for mutual convenience, so that each State may follow its own course of development without detriment to the *existing* rights of the other.

4. It is not stated which portions of the Madras memorandum are considered by the Mysore Durbar to be of "little importance" or "merely of academic value." As to the significance of the expression "fair and reasonable" in rule III of the Agreement, the Madras Government certainly do not wish to minimise it, much less to ignore it. Nor did they ever object to what may be called a "fair and reasonable" application of the law. But it is not easy to see how the theory of "fair and reasonable" is to be woven into the law of prescription. On the other hand, it is much more difficult to detect any element either of fairness or reasonableness in the contention of Mysore (in paragraph 16 of the memorandum) that the improvements made in the Upper Anicut in 1899-1902, *with a view to better utilise the water available,* involve the consequence that pre-existing rights to water must be regarded as *abandoned.* The construction of compound clauses by reading the expressions *distributively* is not unknown to the law of interpretation and certainly not unnatural. The Madras Government do not deny that the facts must first be found before the law of prescription can be applied, but that is a matter of evidence as to intention and use and not one to be determined by any external standards of "fairness" or "reasonableness." But whatever may be the effect to be attached to the expression "fair and reasonable" in rule III, it is certainly impossible to put on that rule the construction contended for by Mysore (in the last sentence of paragraph 5) that it is *for the Arbitration Committee to devise* a method by which Mysore can freely exercise its rights.

5. For the reasons already set forth in paragraph 20 of the Madras memorandum, it is immaterial whether the law to be applied is that known as the rule of common law prescription or that contained in Sections 26 and 27 of the Limitation Act. But the Madras Government are unable to agree that Sections 26 and 27 were present to the minds of the parties to the Agreement.

6. But whatever may be the rule of prescription applicable, it is hard to understand the contention in paragraph 11 of the Mysore memorandum. Resting the case on the Agreement of 1892, what is there to show that the pre-existing rights of Madras were thereby intended to be or were in fact abandoned? If there was any such abandonment, what then are the rights that were intended to be "secured" to Madras by the Agreement and for which the Madras Government so tenaciously fought? Is that to refer merely to rights to be acquired *afresh* in the future by twenty years' enjoyment after 1892? Does it mean that, in the year 1895 or 1900, Madras would have had no rights at all to be protected (for twenty years would not have elapsed since 1892) and that the Mysore Government might have done what they pleased? Surely, this is not the contention of Mysore. What then were the rights of Madras in 1892? How had they been acquired? Was it not by the user that prevailed long prior to 1892? If so, what has now become of those rights? What has Madras done to abandon them or lose them? To say that Madras has lost them by improving the Upper Anicut, is an argument that merely requires to be stated to be refuted. The Upper Anicut, as already stated, was improved, not for the purpose of surrendering or diminishing the rights of Madras, but to better utilize the water that may be available. And, necessity or no necessity, Madras has admittedly and, as a matter of fact, been ever since claiming and taking the 7 feet water whenever available. Where then does the abandonment come in, whether before or after the Agreement? Nor has Madras done anything that may be said to imply an abandonment of its right to the quantity of water required for the Lower Coleroon system. A difference in the method of taking it surely cannot be said to imply an abandonment of the right itself. It is a remarkable inconsistency indeed that in one part of the memorandum

Mysore should contend that the 7 feet claim must be deemed to have been abandoned after 1899, and in another part argue that that claim has been put forward only since 1896 and that it has therefore not yet ripened into a prescriptive right. On the facts of the present case, *Crossley & Sons* v. *Lightowler* (I. L. R., 3 Equity 279 at 294) is really an authority against and not in favour of the argument of abandonment.

7. As to the extent of Madras rights, this Government never claimed a right to *all* the water flowing towards the sea. But, as pointed out in the former memorandum, a certain proportion of the water claimed by this Government must inevitably flow into the sea; for that quantity is necessary to raise the level of water so as to make channel irrigation possible. Paragraphs 13, 19 and 22 of the Mysore memorandum do not in any way advance the case. They merely assert that Mysore has no intention to interfere and that what Mysore proposes to do will not substantially interfere with the prescriptive rights of Madras. The question is what are those rights? No reason whatever is assigned for confining the rights of Madras to irrigation for a *particular acreage* (as distinguished from the quantity of water claimed and taken all along). No notice whatever is taken of the numerous authorities on the point cited in the Madras memorandum. Surely, they are not all disposed of by the opening sentence in paragraph 11. The American authorities, at any rate, are apposite in this connection, for the irrigation law of America has been developed on the basis of its being an "arid region" where irrigation is of vital importance, and nothing to the contrary has been shown to be the rule applied in, or applicable to, India. Such authority as there is in India supports the contention of Madras.

8. No case arises here for the application of the maxim *de minimis non curat lex*. Madras complains, not of the inevitable disturbance of the existing conditions of the *river flow*, but of the necessary interference with its *rights*. If Madras is entitled to the river flow up to 7 feet and to the additions claimed along with it, it cannot be pretended that the Mysore proposals, if carried out, will not *seriously* interfere with those rights.

9. Madras has all along been claiming and all along (whenever there was enough water in the river) been using all the water in the Cauvery up to a limit of 7 feet. The rules of 1896 did not put forward the 7 feet claim for the first time, nor is it then that Madras first used a 7 feet flow. There is, therefore, no force in the contention that twenty years have not yet elapsed since 1896. The facts relating to this aspect of the question have been fully set forth in the Madras memorandum and a few more observations thereon are added *infra*.

10. In paragraph 15 of the Mysore reply, certain arguments are sought to be urged with reference to the law of *easements*. To begin with, it must be pointed out that these arguments are really irrelevant. The Agreement was certainly not intended to bring into operation all the numerous rules of the *private law of easements*, which, in the very nature of things, cannot apply to the parties. The rights of Madras are not even described as being *in the nature of*—for strictly they cannot be—"easements." But it can easily be shown that even under the ordinary law of easements the arguments are untenable.

11. One of the sub-paragraphs of paragraph 15 is evidently intended to suggest that the easement could, as a matter of law, have been acquired only in respect of a *definite* extent of lands and could not avail for more. This proceeds on a fallacious assumption. Literally applying the definition of an "easement" in Section 4, the logical result would be that it could be acquired only for the benefit of a *specific tenement*; but even that will not support the argument of Mysore that the easement must be in respect of a particular *acreage or extent*. They must go the length of contending that the water could be taken only for the specific *plots of land* which have hitherto been cultivated and that the Madras Government cannot take the water for some new plots (not in addition to, but even instead of, the old plots) even though such new plots may adjoin the old *and* even though the Government may keep within the limits of the pre-existing total acreage. This is certainly both unreasonable and fallacious. The mistake arises from a wrong conception of the "dominant heritage" (as used in Sections 21 and 4 of the Easements Act and in *Harris* v. *Flower & Sons*). In the present case, it is not this

particular field or that, but the delta tract as a whole of which the Madras Government is the "dominant owner." The easement has been acquired and used for the benefit of the tract and not of individual fields therein, and so long as it is used for that purpose, the principle of Section 21 is not contravened. The memorandum takes no notice of the numerous authorities cited in the Madras memorandum to show that once a right had been acquired to take a certain quantity of water for irrigating one's lands, it is no improper use of the easement to utilize the same quantity of water to irrigate a larger extent of the same owner's lands. This does not make it a right "in gross" or one *independent of land*. The authorities referred to in that memorandum also establish that such a use involves *no change of purpose*—for the purpose *ex-hypothesi* remains the same, *viz.*, the irrigation of the dominant owner's lands—nor the imposition of a new burden. Whether as a matter of law or of practical convenience, it is impossible to see how the way in which a *lower* riparian owner uses the water that he has all along been taking can add to the burden on the *upper owner*. Once that water passes the upper land, its use by the lower owner cannot affect it in any way, unless the water is swept back on the upper land.

12. It is also suggested that the 7 feet user in the past was in the nature of an "easement of necessity," that the necessity has now ceased and that therefore the right has also ceased to exist. This argument is based on a glaring misapplication of the expression "easement of necessity."

(*a*) It is used in the Act in a narrow sense as defined by Section 13, clauses (*a*), (*c*) and (*e*), from which it will be seen that it is confined to the necessity arising out of partitions or partial transfers or bequests (the transferrer retaining another portion for himself). There is nothing of the kind here.

(*b*) Assuming for the sake of argument that there was anything like a partition or transfer in the present case, the use of the 7 feet of water by Madras did not come about as a *necessity consequent upon such partition or transfer* but had existed long before and certainly had nothing to do with the same.

(*c*) One has never heard of an easement acquired by prescription being regarded as an easement of necessity. As the very name indicates, the latter expression applies to certain rights which *the law presumes* by way of an implied grant, on account of the necessity of the situation and which have nothing to do with length of enjoyment (see Halsbury's Laws of England, Vol. II, article 487).

(*d*) Again, even in the case of a sale or partition, an easement of necessity is presumed by the law only when but for such easement the transferred property could not be enjoyed *at all* (see per Stirling, L. J., in *Union Lighterage Company* v. *London Graving Dock Company*, L. R. (1902) 2 Ch. at page 573; Mitra's Limitation, page 476 of the 4th edition). This cannot be said to be the case here.

(*e*) Further, the easement is one and indivisible and there is no warrant for introducing any differences of degree into the conception and saying that up to a 6 feet depth it was an ordinary easement and that the seventh foot claim was an easement of "necessity."

(*f*) If the mere fact of an easement being enjoyed, because such use is necessary, is sufficient to constitute it an easement of necessity (in the technical sense as used in Section 41), every easement known to law will then be an easement of necessity. This certainly is not the sense in which that expression is used in the Easements Act or the Law of Easements.

13. There is no scope here for the application of the doctrine laid down in *National Guaranteed Manure Company* v. *Donold* (4 H & N 8) that if an easement was granted for a particular *purpose*, it ceases with the *accomplishment* of the purpose. Here the purpose of the easement was the irrigation of the delta lands and that purpose still exists. The depth of flow required relates only to the means necessary for the accomplishment of that purpose. The argument proceeds on a confusion of the term "purpose" with the *methods* adopted for attaining the purpose. Further, the application of the rule must logically lead to the total extinction of the easement and there is no warrant for breaking up a single easement into a 6 feet claim and another extra 1 foot claim.

It is accordingly submitted that the arguments urged and the authorities cited in the Madras memorandum remain unanswered.

Appendix A.

I.

G. O. No. 323 I., dated 11th June 1890.

READ—the following paper :—

Notes of discussion at a Conference held at Ootacamund, on Saturday, 10th May 1890, to consider pending irrigation disputes between Madras and Mysore.

The following gentlemen were present :—

(1) Sir *Oliver St. John*, K.C.S.I., R.E., Resident in Mysore.
(2) Hon'ble Mr. *H. E. Stokes*, C.S.I., Member of Council, Madras.
(3) Mr. *K. Sheshadri Iyer*, C.S.I., Dewan of Mysore.
(4) Colonel *Bowen*, R.E., Chief Engineer, Mysore.
(5) Mr. *G. T. Walch*, Chief Engineer for Irrigation, Madras.

Sir *Oliver St. John* was requested to preside.

The *Dewan* proposed to proceed to the consideration of the cases pending, but Mr. *Stokes* observed that in the correspondence certain pretensions had been put forward on the part of Mysore to the effect that she is entitled to do as she pleases with all water falling in or flowing through her territory; that these pretensions amounted to an absolute negation of all rights on the side of Madras to drainage from Mysore; that if they were maintained there was no basis for discussion; that if, however, it was admitted that Madras has such rights, it might be possible to agree on the principles of a *modus vivendi*, which would on the one hand allow to Mysore reasonable freedom in dealing with her irrigation works, and on the other give to Madras practical security against injury to her interests; and that, if such principles were agreed on, the particular disputes which have arisen could be easily settled in accordance therewith.

The *Dewan* stated that the assertions of Mysore rights alluded to were assumed as the basis of the programme for the restoration of its irrigation works which was inaugurated during the British administration of Mysore and which alone the present Government of Mysore was engaged in carrying out. He read certain passages from Colonel Sankey's papers to the effect that the aim of the operations should be to use up the whole of the rainfall running off the ground, and observed that the scheme in its entirety had been approved at the time by the Government of India. He assumed that this would not have been done if the scheme had trenched on British interests, and considered that the Madras Government was bound by that approval and was not at liberty now to dispute anything that might be done in working out Colonel Sankey's scheme.

Mr. *Stokes* observed that the passages quoted merely affirmed a general *desideratum* in such operations ; that it did not appear that the effect of his principles or proposals on Madras works was ever considered or thought of by Colonel Sankey; that the Government of India in approving the scheme probably regarded only Mysore interests for which they were at the time responsible ; and that in any case the Madras Government, which had no knowledge of the scheme and was neither heard nor consulted in regard to it, could not in such circumstances be held bound by the decision upon it. He said that one of the objects which Madras has now in view is to secure information of projects undertaken by Mysore which may injuriously affect Madras works in order that objection may be urged in due time.

Mr. *Walch* pointed out that it was in the interest of Mysore itself that such information should be given, so that objection, if any existed, might be disposed of before money was spent.

Sir *Oliver St. John* expressed his opinion that the assertion of unlimited right by Mysore was extreme and untenable, and that the approval of the Government of India accorded to the Mysore programme was in no way conclusive of the question as against Madras.

After some argument the *Dewan* stated his position as follows : Mysore has a natural right to the full use of all the water in its territory, but such natural right

is limited by the rights to supply which have been acquired by prescription on behalf of works in Madras. In exercising its natural right, Mysore may do anything which does not injuriously affect the enjoyment of its acquired rights by Madras, or materially diminish the supply to Madras works. The Madras rights extend only to the supply which has been actually turned to account for irrigation. All the rivers flowing from Mysore into Madras pour an unused surplus into the sea. Mysore may intercept and take measures to utilize such surplus, and in view to its interest in it and to preventing the growth or enlargement of the Madras prescriptive rights may as well claim to be informed of and object to new works constructed in Madras for utilizing the river flow as Madras may in regard to what is being done in Mysore.

Mr. *Stokes* said that he was not concerned to dispute the description of the nature and origin of the rights of Mysore and Madras given by the *Dewan*; but he demurred to the word "materially" as qualifying diminution of supply to Madras works, holding that no such diminution is permissible. He refused to admit that the Madras rights to the flow in the rivers was limited to the amount actually turned to account for irrigation, and contended that Madras is entitled by prescription to the whole flow allowed to pass the frontier, at which point Mysore loses all right or interest in it.* All considerations of this sort were, however, abstract, and it was impossible to base practical rules upon them, or to adjust rights with such nicety.

The *Dewan* as an illustration of his meaning as to material diminution took the case (now in dispute) of the tank proposed to impound the head waters of the Chitravati which feeds the Madras tank of Bukkapatnam. The *Dewan* stated that the whole drainage area of the river in Mysore is 581 square miles and in British territory above Bukkapatnam 850 square miles. † The drainage area of the new tank is to be 48 square miles, and he did not consider that interception of this quantity of drainage was a material interference with the supply of the Bukkapatnam tank 50 miles down the river.

Messrs. *Stokes* and *Walch* dissented. Assuming the rainfall throughout the whole area from which the Bukkapatnam tank is supplied is uniform, the diminution on the Dewan's showing is $\frac{48}{1413}$ more than 3 per cent of the whole supply of the tank and more than 8 per cent, of the supply derived from Mysore; and considering that the tank rarely surpluses, such diminution is very material; as a fact, the rainfall at Bukkapatnam may be taken at 17 inches per annum, whereas Colonel *Bowen*, it is stated, calculated it at 24 inches at the site of the new tank.

Asked what was the nature of the restrictions upon Mysore action which the Madras Representatives would propose, they propounded the rules given in the margin. They said these were put forward mainly as a basis for discussion and as indicating the nature of the securities considered necessary in the interests of Madras. They regarded the restriction on the construction of works to divert or store the waters of the main rivers named as of special importance. As to the 100-acre limit on new works in the frontier zone it might seem low, but it was to be remembered that the Madras works in the neighbourhood were as a rule small and that the abstraction of supply for 100 acres might in some cases mean the complete annihilation of a Madras tank.

1. Works which have been disused for twenty years and upwards to be considered to have been abandoned and any restoration of them to be considered as new work.

2. Repairs or restoration of works which have not been abandoned for more than twenty years will not be objected to, provided the area to be irrigated does not exceed the highest actual cultivation in previous years.

3. New works to irrigate more than 100 acres within 30 miles of the frontier measured along the stream dealt with from where it, or the river it falls into, crosses the frontier, or if beyond that distance to irrigate more than 200 acres for any individual work or more than 500 acres for any group of works in the same basin, not to be allowed without consent of the Madras Government.

* It might also have been pointed out with regard to the unused surplus which flows to the sea that to claim it, or part in it, Mysore would have to show that it was Mysore water which thus ran to waste: and that in the case of all the rivers the drainage area and run-off within Madras territory is vastly greater than within Mysore limits.

† These figures are the Dewan's and are not accepted as correct. The Executive Engineer, Bellary, gives corresponding figures 330 and 250 square miles. Scaled from the atlas sheet 325 and 230 square miles are obtained. The abstraction of 48 square miles of drainage is therefore a much more serious encroachment on the Bukkapatnam supply than the Dewan's figures show.

4. No anicuts to be built or reservoirs formed on the rivers named below:—

Tunga.	Arkavati.
Bhadra.	Shimsha.
Tungabhadra.	Hemavathi.
Vedavathi or Hagiri.	Honhole.
Chitravati.	Cubbani.
Papaghni.	Lechmantirta.
Pennar.	Tala Cauvery.
Palar.	Cauvery.
Ponniar.	

Sir *Oliver St. John* observed that the apparent meaning of the rules was that objection might be taken on the grounds stated to Mysore operations, and that any objection made would have to be discussed and if necessary settled by arbitration or reference to the Government of India or in some such way.

The *Dewan* said that the list of rivers included all those flowing out of Mysore and most of those in it, and was altogether too extensive. Mr. *Stokes* stated that the list was designedly drawn up to include all the chief rivers and their most important tributaries, especially those of the Cauvery, the supply of which is vital to Madras. He was willing, however, to strike out the Shimsha and the Arkavati streams which, though draining a large area in the central part of Mysore, were comparatively unimportant as feeders of the Cauvery. It was impossible, however, to consent to free use by Mysore of the waters of the other tributaries which draw their supply from the Western Ghauts and several of which drain even larger areas than the main river.

The *Dewan* considered the proposed rules as altogether unacceptable and in excess of anything which Mysore could agree to. He was not prepared to advance any alternative proposals.

As it was evident that there was no prospect of agreement in regard to any part of the subject, the Conference broke up with an understanding that each side should state its case for the consideration of the Government of India.

OOTACAMUND,
12th May 1890.

H. E. STOKES,
Member of Council, Madras.

G. T. WALCH,
Chief Engineer for Irrigation.

Order—No. 323 I., dated 11th June 1890.

Ordered that the Government of India be addressed.
(Here enter No. 324 I, dated 11th June 1890.)
(True extract.)

G. T. WALCH,
Ag. Secy. to Govt., P.W.D.

To the Chief Engineer for Irrigation, with copy of letter.

II.

Letter—from G. T. WALCH, Esq., Acting Secretary to the Government of Madras, Public Works Department.

To—the Secretary to the Government of India, Public Works Department.

Dated—Ootacamund, the 11th June 1890.

No.—324 I.

I am directed to forward, for the consideration and orders of the Government of India, the accompanying copy of this Proceedings of the Government, No. 325 I.,

dated 11th June 1890, embodying notes of discussion at a Conference held at Ootacamund on the 10th May 1890 to consider pending irrigation disputes between this Government and the Mysore Durbar.

2. I am to say that the Governor in Council considers it of very great importance to the interests of Madras irrigation works that some general principles should be arrived at as to the extent to which the Mysore Government may divert to its own purposes water which now flows to Madras Territory and feeds works therein. The disputes actually pending are not unimportant, but the injury done to the works concerned is as nothing compared to what might accrue if the Mysore Government, which it is believed is engaged in active prosecution of schemes for the improvement of its irrigation works, were to store or divert the waters of the larger rivers which on almost all sides flow from the Mysore plateau to Madras Territory. It will be seen that even with regard to the disputes actually on hand the attitude of the Mysore Durbar is such as to preclude all hope of their yielding due consideration to Madras interests. I am therefore to solicit the interference of the Government of India in bringing such pressure to bear on the Durbar as will secure the interests of Madras.

III.

G. O. No. 743-I., dated 12th December 1890.

READ—the following paper:—

Letter—from the Resident in Mysore.
To—the Chief Secretary to the Government of Madras.
Dated—the 21st November 1890.
No.—3868-346-90.

The Mysore Durbar ask for a copy of the Madras Public Works Department's notes of discussions at a Conference held on the 10th May 1890 to consider pending irrigation disputes between the Madras Presidency and the Mysore State, and of the covering letter to the Government of India.

2. I presume there is no objection to giving these copies, but I want to make sure before doing so.

3. As I have received only one copy of each of these papers* from the Government of India, I have the honour to request that a few spare copies may, if available, be furnished to this office.

* Public Works Department Order No. 323 I., dated 11th June 1890.
Letter No. 324 I., dated 11th June 1890, to the Government of India, Public Works Department.

Endorsement thereon in the Political Department, dated 28th November 1890, transferring the above.

Order—No. 743 I., dated 12th December 1890.

Ordered that the Resident be addressed in the Political Department.
(True Extract.)

G. T. WALCH,
Joint Secy. to Govt., P. W. D.,
Irrigation Branch.

To the Political Department, with copy of draft letter to the Resident.
,, Chief Engineer for Irrigation.

5

IV.

Letter—from the Hon'ble Mr. J. GROSE, I.C.S., Chief Secretary to the Government of Madras, Political Department.

To—the Resident in Mysore.

Dated—Fort St. George, the 16th December 1890.

No.—636.

With reference to your letter No. 3868-346-90, dated 21st November 1890, I am directed to state that there is no objection to copies of the notes of discussion and covering letter to the Government of India being supplied to the Mysore Durbar.

2. I enclose six copies of the papers in question for the use of your office.

Enclosures.

Demi-official—from G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

To—K. SHESHADRI IYER, Esq., C.S.I., Dewan of Mysore.

Dated—Madras, the 12th November 1890.

We have just received from the Government of India your memorandum, 12th June, and its covering letter. Will you kindly tell me if you have received from the Government of India our "Notes of discussion at a Conference," dated 12th May 1890, and of its covering letter to the Government of India, and, if so, how you have dealt with them?

It appears to me that our proposed rules 1 to 3 are more favourable to you than your 1 to 4 and that it is only as regards your rule 5 that we are hopelessly at variance.

Demi-official—from K. SHESHADRI IYER, Esq., C.S.I., Dewan of Mysore.

To—G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

Dated—Mysore, the 19th November 1890.

Your letter of the 12th July reached me and I have had to write to Bangalore and enquire before replying. Hence the delay. I have never seen your "Notes of discussions at a Conference, dated 12th May 1890," nor your covering letter to the Government of India and they have never been forwarded to us. My memorandum of 12th June and its covering letter were written without any definite knowledge of what you were prepared finally to concede. If I can have an opportunity of seeing your definite proposals, I will try and see to what extent mine can be modified so as to effect, if possible, an arrangement satisfactory to both Mysore and Madras raiyats. With kind regards.

V.

Demi-official—from W. MCHUTCHIN, Esq., Chief Engineer, Public Works Department, Mysore.

To—G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch.)

Dated—the 12th May 1891.

The enclosed is, I think, what we arrived at as a possible basis for future agreement. I have made a few alterations of little consequence in margin.

6

Enclosure.

Along the whole course of the main streams scheduled below, and an all other streams within Λ miles of the frontier (measured along the streams) works * which have been out of use for twenty years and upwards to be considered to have been abandoned and any restoration of them to be considered as *new works*, but on streams other than those scheduled at a greater distance than Λ miles from the frontier, restoration of works once in existence but out of use, no matter for what length of time, to be considered simply as *Repairs*.

Λ 30 (open to modification).
* Reservoirs, anicuts to be allowed.

Λ 10

2. *Repairs* of irrigation works not to be objected to provided the area to be irrigated by them does not exceed that previously † irrigated.

† NOTE.—Any work to be substituted for existing works but merely to irrigate the same area as those works to be treated as a repair work.

Λ 30

3. No new works to be constructed on any part of the streams scheduled below or on any streams whatever within Λ miles of the frontier without consent ‡ of Madras Government, but elsewhere to be unrestricted.

‡ NOTE.—Consent to be given to those now far advanced, to be specified, with the understanding that, if hereafter damage to existing irrigation works in British territory be proved to have been caused by such works, compensation for same (the damage) shall be paid.

4. The schedule referred to above is the same as in No. 4 of Madras rule—leaving out the Arkavati, Shimsha, Honhole and § Tala Cauvery.

§ Said not to be in Mysore.

5. The rules to apply, as far as may be, to the Madras Government as regards streams flowing through British territory into Mysore.

VI.

Demi-official—from W. MCHUTCHIN, Esq., Chief Engineer, Public Works Department, Mysore.

To—G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

Dated—Bangalore, the 29th June 1891.

I, to-day, send you three copies of the "Rules" proposed by Mysore, as promised at the Conference at Ootacamund in May. An explanatory memorandum and three lists (Schedules A, B and C) are attached to each set of rules. One copy, Ordnance maps of Mysore, is also sent, on which all the streams and catchments entered in Schedules A and B are coloured blue. An index map on a small scale is also enclosed, and from this you can see at a glance, from the figures entered on the map, where to look on the larger map for any of the streams or catchments in the schedules.

I am directed to say that the Dewan is most anxious for an early settlement, and in the very exhaustive character of Schedule B I hope you will see ample proof of such anxiety.

Enclosures.

Explanatory memorandum to accompany to draft "Rules defining the limit within which no new irrigation works are to be constructed by the Mysore State without previous reference to the Madras Government."

I. It was mutually agreed at the Conference held at Ootacamund on Friday, 22nd May 1891, that the proposal of Mysore to consider each individual stream, or catchment area, separately on its own merits, would be a more suitable method of arriving at an arrangement whereby both Madras and Mysore interests should be protected.

II. With this view the accompanying draft of rules and appended schedules have been prepared after very careful consideration. Special pains have been taken to exclude from Mysore operations all streams and catchment areas which can reasonably be regarded as affecting existing Madras interest to any extent whatsoever.

III. The general principle of the draft rules now proposed is the same as that of the rules recently drawn up in the Madras Public Works Department. The Mysore programme of Public Works will be seriously curtailed by the adoption of even the rules now proposed, but the Durbar are most anxious to have some immediate settlement on the subject in order to be able to revise their programme and to have some projects ready to hand against an adverse season which unfortunately is already threatening. Mysore operations outside the limits of Schedules A and B cannot, it is believed, affect existing Madras works, nor can such works, which depend upon floods in the streams supplying them, be affected by direct irrigation in Mysore from channels drawn from such streams by means of anicuts.

IV. In order to further illustrate the scope of these rules, and the exhaustive character of the list of streams included in Schedule B, the following remarks on each of the main river drainages entered in Schedule A are offered:—

(1) *Tungabhadra drainage.*—On this drainage there are only two streams on which there are any existing Madras works, if the anicuts on the Tungabhadra are left out of account as being almost entirely dependent on floods in the river; these are the—

(i) The Jiganhalli tank catchment.
(ii) Antapur tank catchment.

These catchments extend into the Molakalmuru taluk of Mysore, and have been entirely excluded from Mysore operations (items Nos. 9 and 10 of Schedule B).

As regards the Madras works on the Tungabhadra itself, the nearest of these to the frontier is, it is believed, the Walvapur Anicut in the Hospet taluk some 87 miles below the frontier measured down the stream, and below this there are several other existing anicuts with their subsidiary works.

These anicuts are entirely dependent on floods in the river, and these floods are caused by the run-off from the Malnad (or Western Ghaut) portions of the catchment in the upper reaches of the Tunga and Bhadra rivers above Shimoga and Lakvalli, where the rainfall over large areas is from 150 to 250 inches during the south-west monsoon. The scanty and intermittent supply received by the river (Tungabhadra) from the smaller drainages in the dry tract below Shimoga and Lakvalli does not materially affect the floods; this scanty supply is of no practical benefit to Madras works, as they chiefly occur (if ever) in November or later in the year, but are of incalculable benefit to Mysore in the arid tracts of Chitaldrug.

(2) *Vedavati, or Hagiri, drainage.*—Taking the minor drainages of this catchment in order these are—

(11) Chinna-Hagiri.
(12) Nagalapura tank (Madras) catchment.
(13) Rangasamudram tank (Madras) catchment.
(14) Yeradkere tank (Madras) catchment.
(15) Main stream of Talak drainage.
(16) Main stream of Doderi drainage.
(17) Virapsamudram and Amrapur tank (Madras) catchments.

Nos. (12), (13), (14) and (17) affect supply to existing Madras tanks and the entire area of these catchments is included in Schedule B. It is believed these are the only catchments on this drainage (Vedavati) flowing out of Mysore Territory on which there are existing tanks below in Madras Territory.

The other three streams in Schedule B, in addition to the main stream in Schedule A, are the main feeders of the river, and Mysore operations up to the points noted in the schedule have been restricted to repair works.

In this catchment again the larger proportion of the floods in the river from June to October are due to the heavy rainfall in the upper reaches of the river,

and the run-off from the catchments in the dry and arid portions of the catchment near the frontier is of little use in supplying the anicuts on the river (if any such exist) in Madras Territory; floods on these small catchments are generally experienced in the end of October or in November and even then are of comparatively rare occurrence, and of short duration.

(3) *Pennar or North Pinakini drainage.*—Attention may be drawn to Colonel Smalley's remark in paragraph 19 of his No. 674, dated 10th June 1890. There are no existing Madras works on this river for a distance of 200 miles or so from the frontier (as measured down the stream); there are, however, some five tanks near Hindupur which receive a supply from channels with open heads from the river; presumably these tanks would only receive a supply in times of floods in the river.

It will, however, be seen that in addition to the main stream in Schedule A, Mysore has consented to restrict its operations on the whole length of two of the principal feeders as well as on considerable lengths on the Kumadavati and Jayamangali rivers. The whole of such catchment areas in Mysore Territory as directly affect the supply to tanks in Madras have been also excluded from Mysore operations.

(4) *Chitravati River drainage.*—In addition to the main stream, the lower portion of the main feeder (the Kushavati) as well as a large area to the north of the Chelur-Bagenhalli road, have been included in Schedule B. The portion of the catchment to the north of the Chelur-Beganhalli road being for the greater part very hilly and steep, a large proportion of the flow from the catchment is obtained from this area. The large Gudibanda tank on the main feeder impounds most of the run-off from the area above it.

(5) *Papaghni River drainage.*—The list of streams in Schedule B includes the portions of all the principal feeders in Mysore Territory below terminal tanks now in existence on those streams. The streams above these terminal tanks are close to the steps of the watershed, from 5 to 6 miles in all cases; on these upper portions of the catchment there are numerous tank already in existence, and the surplus supply from these upper streams is very little; the country is nearly all under cultivation, and the run-off from ploughed soil or land when under crops very small.

(6) *Palar River drainage.*—Schedule B includes all the principal feeders of the river. The other drainages on the eastern and southern frontier are very small and of no importance either to Madras or Mysore.

On this catchment there are, it is believed, no Madras tanks on any of the drainages from Mysore territory; and there are no works in the Palar river, it is believed, above the Palar Anicut near Arcot, about 85 miles from the frontier of Mysore.

It may also be mentioned that, on the main drainage of the Palar river in Mysore, there are 1,000 tanks, some of them of very large size, on 803 square miles of catchment area, and assuming a supply of 48,000 units (1 unit=10,000 cubic yards) as available from the catchment, which would be equivalent to a run-off of 7 inches per square mile, we only obtain an average of 48 units as available for each tank now in existence! The surplus water available therefore from such a catchment as this would be of very little use to help the floods in the Palar river.

7. *The Pennar or South Pinakini drainage.*—All the principal feeders of the river in Mysore territory are included in Schedule B. There are, it is believed, no Madras works on this river above the Tirukkoyilur Anicut in South Arcot some 140 miles from the Mysore frontier.

On this catchment there are numerous tanks in existence on all the minor streams. The details of the principal tank series on this catchment above terminal tanks are—

(1) Koppa—47·7 square miles, 76 existing tanks—units available at 60 units per square mile=2,862.

or only 38 units to each tank, many of which are large and important.

		Sq. miles.	Tanks.	Units available.	Units per tank.
(2) Budikote series	... ...	114·5	160	6,870	43
(3) Masti „	... ...	45·4	63	2,724	43
(4) Malur „	... ...	66·5	65	3,990	61
(5) Vagata „	... ...	31	33	1,860	56
(6) Hoskote „	including Kadgodi ...	524	246	31,440	128
(7) Vartur „	... ...	106	122	6,360	52
(8) Bidarguppe series	... ...	88	109	5,280	50
(9) Attibele „	... ...	38	62	1,596	37

The Budikote stream below the Mysore terminal tank is of considerable length, as also the Koppa stream; but the surplus supply available from above the terminal tanks in these cases would be very little.

The whole of the Masti series has been conceded, as the catchment is hilly, and the run-off perhaps more than here estimated.

The run-off from the terminal tanks in the Vagata and Malur series would be small as the lower tanks are of comparatively large size.

The Hoskote series is perhaps of some importance for supply, and the principal feeder—the Kadgodi branch of this stream—has been conceded.

The run-off from the terminal tanks in the Vartur, Attibele and the Bidarguppe series is small, the terminal tanks themselves and those immediately above these being very large and important.

(8) *Cauvery River catchment.*—Here, as in the Tungabhadra, the floods in the river are mainly supplied by the run-off from the catchments in the upper reaches of the several main feeders situated in Manjarabad, Coorg and Heggaddevankote. The run-off from the minor catchments in Chamrajnagar and Malvalli taluks of Mysore, near the frontier, do not materially affect the floods in the river, upon which, it is believed, the Madras irrigation works below almost entirely depend for their supply.

As the Durbar are most anxious for some early definite arrangement, they have included in Schedule B streams and drainages of doubtful benefit to Madras, but of vital importance to Mysore. The foregoing remarks and a glance at the map will show that the arrangement now proposed is more suitable in every way than fixing any particular limit of distance from the frontier all round, without regard to the varying circumstances of particular localities and drainages.

V. *Schedule C* is a list of works now in progress which would be affected by the rules now proposed, but as these works were started before the question of the diminution of the supply to Madras works arose, they are to be allowed to be completed.

VI. A list is under preparation of the more important irrigation works which either had been, or are now, under contemplation by Mysore, and which under the rules now proposed will have to be submitted to the Madras Government for their consent before being undertaken.

VII. The following maps accompany:—

(i) Rolled map of Ordnance Survery sheets, 4 miles to an inch, on which the rivers and streams defined in Schedules A and B are coloured blue; the catchment areas in Schedule B being also coloured blue; the numbers entered in red ink on the map are the serial numbers as entered in Schedule A, and the blue figures serial numbers are entered in Schedule B.

(ii) An index map, 16 miles to an inch scale, on which the rivers and streams and catchment areas are also shown.

Draft of rules defining the limits within which no new irrigation works are to be constructed by the Mysore State without previous reference to the Madras Government.

I. In these rules—

(1) "*New irrigation reservoirs*" shall mean and include such irrigation reservoirs or tanks as have not before existed, or having once existed, have been abandoned and had been in disuse for more than thirty years past.

(2) A "new irrigation reservoir" fed by an anicut newly built across a stream shall be regarded as a "*New irrigation reservoir across*" *that stream.*

(3) "Repair of irrigation reservoirs" shall include (*a*) increase of the level of waste weirs and other improvements of existing irrigation reservoirs or tanks provided that either the quantity of water to be impounded or the area to be irrigated, is not more than the quantity previously impounded, or the area previously irrigated, by them, and (*b*) the substitution of a new irrigation reservoir for and in supersession of an existing irrigation reservoir but in a different situation, or for and in supersession of a group of existing irrigation reservoirs, provided that the new work either impounds not more than the total quantity of water previously impounded by the superseded works, or irrigates not more than the total area previously irrigated by the superseded works.

(4) Any increase of capacity other than what falls under "Repair of irrigation reservoirs" as defined above shall be regarded as a "New irrigation reservoir."

II. The Mysore Government shall not, without the previous consent of the Madras Government, or before a decision under rule 4 below, build any "New irrigation reservoirs" across any part of the thirteen main rivers named in the appended Schedule A, or across any stream named in Schedule B below the point specified in column 5 of the said Schedule B, or in any drainage area specified in the said Schedule B.

III. When the Mysore Government desires to construct any "new irrigation reservoir" referred to in the last preceding rule, then full information regarding the proposed work shall be forwarded to the Madras Government and the consent of that Government shall be obtained previous to the actual commencement of work. The Madras Government shall be bound not to refuse such consent except for the protection of prescriptive right already acquired and actually existing, the extent and nature of such right and the mode of exercising it so as to control or limit the natural right of the Mysore State being in every case determined in accordance with the law on the subject of prescriptive right to use of water and in accordance with what is fair and reasonable under all the circumstances of each individual case.

IV. Should there arise a difference of opinion between the Madras and Mysore Governments in any case in which the consent of the former is applied for under the last preceding rule, the same shall be referred to the final decision either of arbitrators appointed by both Governments, or of the Government of India.

V. The Mysore Government shall not be bound to obtain the consent of the Madras Government as regards—

(*a*) any *anicut* across any river or stream at any point of its course whatsoever, not being an anicut such as is referred to in clause (2) of rule 1, or

(*b*) any "Repair of irrigation reservoir" as defined in clause (3) of rule 1 wherever the same may be situated, or

(*c*) any "New irrigation reservoir" other than one falling under rule 2.

VI. The consent of the Madras Government to be given to new irrigation reservoirs specified in the appended Schedule C. Should, owing to the omission of the Mysore Government to make or maintain these works in a reasonably adequate standard of safety, irrigation works in Madras, themselves in a condition of reasonably adequate safety, be damaged, the Mysore Government shall pay to the Madras Government reasonable compensation for such damage.

N. B.—A common understanding as to what is a proper standard of safety in regard to the particular new and old works in question would be useful. The Durbar are willing to agree to anything reasonable as to such a standard for their works.

VII. The foregoing rules shall apply, as far as may be, to the Madras Government as regards streams flowing through British territory into Mysore.

SCHEDULE A.

Main rivers.	Remarks.
1. Tungabhadra	
2. Tunga	Tributary of the Tungabhadra.
3. Bhadra	Do
4. Hagiri or Vedavati	Do
5. Pennar or Northern Pinakini	.....
6. Chitravati	Tributary of the Ponnar or Northern Pinakini.
7. Papaghni	Do do
8. Palar	.....
9. Pennar or Southern Pinakini	.....
10. Cauvery	.....
11. Hemavati	Tributary of the Cauvery.
12. Lakshmantirtha	Do do
13. Kabbini	Do do

SCHEDULE B.

A list of the minor streams and catchments in Mysore territory on which no new irrigation reservoirs are to be built within the limits specified without previous reference to the Madras Government.

Serial numbers in Schedule A.	Drainages	Serial numbers.	Minor branches	Defined limit on a stream below which, or defined dainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	
I	Tungabhadra ...	1	Sulikere-halla ...	The bund of Sulikere tank.	46 miles ...	The Sulikere tank seldom discharges. This stream joins the Tungabhadra in Mysore territory.
		2	Sagali-halla ...	Up to the boundary line of the Channagiri taluk.	40 do ...	About this point there are numerous existing tanks, and the run-off from these smaller catchments are of no appreciable importance to floods in the Tungabhadra river.
		3	Sarati-halla ...	As far as the boundary line of the Kakkargola and Avargola villages.	9½ do ...	A stream of insignificant importance to floods in the Tungabhadra river. This stream joins the Tungabhadra river in Mysore territory.
		4	Branch of Sarati-halla from east	Up to Kadaji tank bund ...	16½ do ...	Catchment above the Kadaji tank small and insignificant.
		5	North Hagari ...	Up to boundary of Chitaldrug taluk ...	12½ do ...	There are no existing Madras works on this branch of the Tungabhadra.
		6	Branch of do ...	Up to Anaji tank bund ...	10 do ...	
		7	Sokke-halla ...	Up to the Hosakere tank bund.	9 do	No existing Madras works on this stream before it joins the North Hagari. Catchments above Hoskere and Kyasenhalli tanks very small and insignificant.
		8	Branch of Sokke-halla.	Up to the Kyasenhalli tank bund.	9 do	
		9	Jiganhalli tank (Madras) catchment.	The whole of the outlying bit of Mysore territory which drains into this Madras tank.	Do ...	This is an outlying bit of Mysore territory in latitude 14-55; longitude 76-38′
		10	Anantapur tank (Madras) catchment.	The whole of the area of the extreme northern portion of the Molakalmuru taluk in Mysore which drains northwards into the Anantapur (Madras) tank catchment.	Do ...	There are existing Madras tanks below, and the whole area which drain into such tanks is included.
IV	Vedavati or Hagari.	11	Chinna-Hagari.	Up to the bridge over this stream on the Salem-Bellary road.	8¾ miles ...	No existing Madras works affected. This stream joins the main river about 8 miles beyond the frontier.
		12	Sherikola-halla or Nagalapura tank (Madras) catchment.	The whole catchment area in Mysore territory.	Do ...	Affects the supply to Madras tank below.
		13	Rangasamudram tank (Madras) catchment.	The whole area of catchment of the tank in Mysore territory.	Do ...	The stream from this catchment leaves Mysore territory in latitude 14-37′-30″ and longitude 76-48′-30″.
		14	Yeradkere tank (Madras) catchment.	Do do ...	Do ...	The Yeradkere in Madras is on latitude 14-30′: longitude 76-57′-30″.
		15	Main stream of the Talak drainage.	Up to the bridge over this stream on the Salem-Bellary road.	15½ miles ...	The road is a convenient point for a limit. No Madras works affected. This stream joins the Vedavati river within Mysore limits.
		16	Main stream of the Doderi drainage.	Up to the boundary of the Hosahalli village.	17½ do ...	Latitude 14-21′: longitude 76-49′. No existing Madras works affected. This stream joins the Vedavati river within Mysore territory.

SCHEDULE B—*contd.*

Serial number in Schedule A.	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which or defined drainage area within which, no new irrigation reservoir are to be built without previous reference to Madras Government	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
IV	Vedavati river Hagari—*contd.*	17	Virapsamudram and Amarapur tank (Madras) catchments.	The whole area of catchment of this series in Mysore territory.	27½ miles ...	This area represents a large proportion of the Pavagada taluk of Mysore.
V	Pennar or Northern Pinakini.	18	Mulkalkara tank (Madras) catchment.	Do do ...	Do ...	This Madras tank is situated in latitude 14-8'; longitude 77-26'-20."
		19	Ruddam tank (Madras) catchment.	Do do ...	Do ...	A considerable area in the north of the Maddagiri taluk of Mysore is on this catchment.
		20	Virapsamudram tank (Mysore) catchment.	Do do ...	Do ...	This terminal tank is in south-east corner of the Pavagada taluk of Mysore, but there are some Madras tanks above in the Madakasira Tahsildari. The catchment excluded from Mysore operations is chiefly in the north of the Maddagiri taluk.
		21	Purghi tank (Madras) catchment.	Do do ...	Do ...	The catchment excluded from Mysore operations is in the north of the Maddagiri taluk.
		22	Jayamangali river.	Up to its junction with the Garudachala stream.	28 miles ...	The river above this point is of minor importance to Madras.
		23	Suvarnamukhi branch of Jayamangali.	Up to site of Rampur anicut.	25 do ...	Joins the Jayamangali a few miles below this point.
		24	Kumadvati ...	Up to site of anicut feeding the Kodagatur and Gundagal tanks in Mysore.	9½ do ...	This stream joins the Pennar on the Mysore frontier.
		25	Chaulur tank (Madras) catchment.	The whole direct catchment of this tank in Mysore territory.	Do ...	This Madras tank is on the west bank of the Pennar just outside Mysore territory.
		26	Western or Thondebhavi branch of the Pennar or N. Pinakini.	Up to its source ...	27 to 30 miles.	.....
		27	Central or Varvani branch of the Pennar or N. Pinakini.	Do ...	25 miles ...	.....
		28	Hindupur tank (Madras) catchment.	The whole area of catchment of this series in Mysore territory.	Do ...	An important and large area of the Goribidnur taluk is here excluded from Mysore operations in a part where water for irrigation is much appreciated.
VI	Chitravati ...	29	Kushavati stream (Bukkapatna tank catchment in Madras).	Up to site of Departi anicut.	10½ miles ...	The large Gudibanda tank in Mysore and the 20 smaller tanks above impound a very large proportion of the upper catchment already.
		30	Chitravati catchment [Bukkapatna tank (Madras) catchment].	The whole area to the north of the Chelur-Bagenhalli road.	Do ...	This portion of the Chitravati catchment being more hilly and barren, the run-off is greater than in the more cultivated and level catchment to the south of the Chelur-Bagenhall road.
VII	Papaghni river...	31	Vandaman-halla.	Up to Naremadipalli tank.	9½ miles ...	No Madras works affected up to the junction of this stream with the Papaghni river.

SCHEDULE B—*concld.*

Serial number in Schedule A.	Drainages	Serial numbers	Minor branches	Defined limit on a stream below which or defined drainage area within which, no new irrigation reservoirs are to be built without previous reference to Madras Government.	Distance from frontier as measured up the stream (approximate)	Remarks
1	2	3	4	5	6	7
VII	Papaghni river —*contd.*	32	Guntpalli tank (Madras) catchment.	The whole area of catchment in Mysore territory.	9½ miles ...	This Madras tank is situated just above the large Vyasasamudram tank.
		33	Sadam tank (Madras) catchment.	The main stream up to its source.	17 to 18 miles.	This Madras tank, the waterspread of which is partly in Mysore territory, drains into the Papaghni river just above the Vyasasamudram tank.
		34	Kotogal branch of the Papaghni.	Up to Kotagal tank ...	Do ..	The catchment above Kotagal tank is comparatively small and unimportant with numerous small tanks already on it.
		35	Tippasamudram tank (Madras) catchment.	The Marasanpalli-Digavakote stream up to Digavakote-Pathacheruvu tank; and the Marasanpalli-Gundedu stream up to Gundedu tank.	9½ miles ...	These are the only two important streams on this catchment, and above these terminal tanks there are a large number of small tanks on the small drainages. These terminal tanks are only situated from 4 to 5 miles from the watershed of the Palar.
					13 do ...	
		36	Rangasamudram tank (Madras) catchment.	Adgal stream up to Adgal-Vasankanayikankere tank.	6½ do ...	The Adgal tank is situated 6 miles from the watershed, and there are numerous tanks in this distance.
				Kurigepalli branch stream up to the Kurigepalli tank.	4½ do ...	The Kurigepalli tank is only 4 miles from the watershed, and there are some 18 small tanks above it.
VIII	Palar river ...	37	Nangli (Mysore) tank drainage.	Main stream up to its source.	17½ do ...	There are 12 Mysore tanks situated on this main stream.
		38	Shettikal (Mysore) tank drainage.	Do do ...	10 do ...	There are about 5 existing Mysore tanks and 1 breached tank on this main stream.
		39	Malinayikanhalli (Mysore) drainage.	Do do ...	6½ do ...	There are 4 existing Mysore tanks on this main stream.
		40	Vegmadgu (Mysore) drainage.	Do do ...	7 do ...	There are 4 existing Mysore tanks on this main stream.
		41	Tailur tank (Mysore) drainage.	Do do ...	23 do ...	There are 10 Mysore tanks on this important branch of the Palar, the terminal tank being 12½ miles from the frontier.
IX	Pennar or South Pinakini.	42	Verushuvavati river.	Main stream up to Koppa (or Kuppam) tank.	16 do ...	There are 76 tanks above the Koppa tank which is only some 12 miles from the watershed.
		43	Budikote stream.	Main stream up to Thimmanayanhalli tank.	21 do ...	There are 146 tanks above this terminal tank which is only about 12 miles from the watershed.
		44	Masti catchment.	The whole area of catchment in Mysore territory.	21 do ...	About 45·40 square miles in area in which there are 63 tanks in existence.
		45	Kadgodi drainage.	Main stream up to its source.	36 do ...	There are 10 Mysore tanks on this main stream now in use, most of them of large size.

Alterations proposed by Madras in the Mysore draft rules received with Mr. McHutchin's letter of 29th June 1891.

Remarks and explanatory notes.

Otherwise Mysore might connect existing anicuts with new storage reservoirs.

(1) *Rule I, clause* (2).—Strike out "*newly built.*"

(2) *Rule II.—After* "new irrigation "reservoir," *insert* "*or any new anicuts.*"

(3) *Rule III.—After* "new irrigation "reservoir," "*insert or anicut.*"

Strike out—

"*so as to control or limit the natural* "*right of the Mysore State*" and also "*in* "*accordance with the law on the subject of* "*prescriptive right to use of water and.*"

(4) *Rule V, clause (a).*—Strike* out altogether.

Clause (c).—Add "or anicuts" after "new irrigation reservoir."

(5) *Rule VI* to run somewhat thus:—

"The consent of the Madras Govern- "ment to be given to the new irrigation "works specified in Schedule C. Should, "however, their construction cause a "diminution of the water-supply, or "should their destruction or breaching "result in damage to Madras irrigation "works, the Mysore Government shall pay "to the Madras Government reason- "able compensation for such dimi- "nution of supply, or damage, claims for "such compensation shall be settled, in "case of difference of opinion, as provided "in rule IV."

(6) *Schedule A.—Add—*

Honhole (or whatever may be the recognized name of the river which joins the Cauvery from the south near Kollegal) (? Suvarnavati—see Index map).

*Yegæhy or** *Yegachy* (an affluent of the Hemavati which it joins near Goroor).

(7) *Schedule B—Add—*

"Choardy river", affluent of the Tungabhadra as far as "Coomsee" on its main course and as far as "Umblygola" on its western branch.

Alter—

distance from frontier of "No. 11 Chinna Hagiri" or "Janagahalla" from that stated in the schedule, *viz.*, "up to bridge over this stream on the Salem-Bellary road", to

"up to where it crosses the frontier near Rungyan Droog." (*Note.*—This alteration is made on the supposition that where the river appears from the atlas

* NOTE.—Though no single anicut could do much harm to Madras interests, a series of anicuts on the scheduled streams might do so, and therefore it is necessary not to agree to Mysore having unrestricted power to construct such works, all that the omission implies is that consent shall be obtained.

NOTE.—Subject to this revised rule, we can accept Schedule C. It is noted that in items 28, 30 and 44 in Schedule B the works specified in Schedule C apparently cover the whole drainage area in which Madras interest is admitted

:See Atlas sheet.

sheet to form the boundary between Bri tish territory and Mysore between just north of Chicka-Mallinhalli and Rungyan Droog, it lies wholly in British territory—if this is not the case then the alteration to be to "up to 20 miles from where it strikes the frontier a short distance north of Chick-Mallinhalli.")

G. T. WALCH.

8th July 1891.

VII.

Demi-official—from G. T. WALCH, ESQ., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

To—W. MCHUTCHIN, ESQ., Chief Engineer, Public Works Department, Mysore.

Dated—Ootacamund, the 7th July 1891.

Mr. Stokes and I have been through your proposed rules and I give on a separate sheet the alterations and additions which we consider essential. I think you will see that we have made very considerable concessions in order to meet Mysore on the way to an amicable agreement. The next step will be for the rules proposed by Mysore (with the corrections now asked for by us, or as near an approach to them as may be agreed to) to be sent to us in the regular official way *through the Resident* who should be informed of what has preceded this official submission of your proposals.

VIII.

Demi-offical—from Col. C. BOWEN, R.E., Chief Engineer, Public Works Department, Mysore.

To—G. T. WALCH, ESQ., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

Dated—Bangalore, the 20th July 1891.

Your demi-official of 7th to McHutchin regarding the proposed rules for settlement of water disputes he handed over to me, and I took it down to Mysore last week for discussing and orders.

The following is the decision arrived at by the Durbar regarding the modification of draft or fresh proposals now brought forward :—

To strike out the words "newly built" in rule I, clause (2), *is agreed to.* Mysore cannot agree to insert the words "or any new anicuts" after "new irrigation reservoirs" in rule II, as proposed by you.

Mysore must also dissent from the addition of "or anicut" to rule III. The elimination of the words "so as to control or limit the natural right of the Mysore State" in same rule the Dewan agrees to, but he cannot agree to the elimination of the words "in accordance with the law on the subject of prescriptive right to use of water."

Further he cannot agree to striking out clause (*a*) of rule V, nor to the addition of "or anicuts" after "new irrigation reservoir" in clause (*c*) of same rule. But, if necessary, the whole of this rule can be omitted.

Mysore cannot agree to the modification now proposed in seven last lines of rule VI.

The addition of Honhole river to schedule A is agreed to, also the addition of Yagachi river, but only up to the Belur bridge.

Modifications now proposed to schedule B are agreed to.

I may remark on the above that to include "or any new anicuts" under rule II would bar Mysore from further utilizing *for direct irrigation* the ordinary flow of the rivers specified from the month of June to December.

Such ordinary flow is believed to be of little or no use to Madras. By such flow I mean up to average daily level of water in those months.

To eliminate from rule III the words "in accordance with the law on the subject of prescriptive right to use of water" would be to acknowledge that Madras Government, in considering the existence, extent and nature of a prescriptive right to be possibly affected by a proposed Mysore work, could set aside or refuse to be guided by the law on the subject. Nor does it seem reasonable to propose to disregard such law in such cases as may come up for mutual settlement and agreement.

I have said that the whole of rule V may be omitted, if necessary. The clauses, clause (*b*) perhaps excepted, seem to be redundant, as the points that will be at issue and call for settlement are covered by the rules preceding.

The original wording of rule VI seemed very reasonable, and I understand it was agreed to in substance at last conference at Ootacamund. Madras would have the opportunity of examining the question of the effect on their works of proposed Mysore works, and, having given their consent to the latter, it would be unreasonable for Mysore to be subsequently subjected to claims for compensation for alleged diminution of supply. Such a reading as you propose would admit of, if not encourage, all sorts of claims on the part of Madras raiyats. And compensation for loss following on the destruction of any Mysore work is fairly covered by rule VI as drafted and the marginal note regarding a common understanding as to standard of safety. A claim for compensation because of the destruction of a work from an extraordinary convulsion of nature—a storm or cyclone beyond ordinary experience—could not be accepted by Mysore.

The addition of river Yagachi to schedule A is accepted only up to Belur. The river higher up has numerous branches having many anicuts across them, all of which require improvements more or less. Such works indeed would have absolutely no effect on Madras.

I fear all this will delay settlement, but it cannot be helped.

IX.

Demi-official—from G. T. WALCH, ESQ., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

To—Col. C. BOWEN, R. E., Chief Engineer, Public Works Department, Mysore.

Dated—Ootacamund, the 27th July 1891.

Yours of 20th. As regards the alterations, in your draft rules, proposed by Madras to which you now object.

(1*st*) We must adhere to our contention that *prior reference* must be made about construction of anicuts on the scheduled streams; you will note that the latter part of rule III and rule IV provide against refusal of permission by Madras on insufficient grounds and, therefore, what we propose would by no means rigidly bar, as you seem to think, the construction of any anicuts on the scheduled streams for direct irrigation, but would only give us the right to object to such as would seriously affect Madras supply.

(*2nd*) We agree to leaving in your rule III the words "in accordance with the law on the subject of prescriptive right to use of water and."

(*3rd*) We agree to striking out rule V altogether.

(*4th*) As regards your remarks about our proposed alteration of rule VI, which, please remember, refers only to schedule C works, and not to any works to which, in future, consent may be given,—neither Mr. Stokes nor myself remembers that

at the last conference anything was said about giving up all claim on account of *diminution of supply* caused by the works commenced without reference to Madras and to which we have for some time past taken exception but to which we now propose to agree on certain terms; and most certainly nothing was said about providing Mysore with a clean bill of health as regards those works, the efficiency of the mode of construction of which we have had nothing to do with; to lay down a "standard of safety" about them we consider impracticable. We are not prepared to forego possible claims under the heads of "diminution of supply" and "damage" as regards—

(*a*) New Srinivasagara reservoir,
(*b*) New Ramasamudram ,,
(*c*) New Venkatesagara ,,

but we will let the others go, and even as regards those three works, we will limit the claim for diminution of supply to *one time within ten years of the completion of the work*, any such claim to be adjudicated upon as provided for in rule IV.

(*5th*) We accept the modification of the scheduled distance up the Yagachi river to "as far as the Belur (?) bridge" as proposed by you.

X.

Demi-official—from Col. C. BOWEN, R.E., Chief Engineer, Public Works Department, Mysore.

To—G. T. WALCH, ESQ., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

Dated—Bangalore, the 6th August 1891.

Your further note of 27th ultimo, regarding modifications of proposed draft rules for settlement of the water controversy, I duly laid before the Dewan, and, after full consideration of all details, he desires me to communicate to you his views as follows:—

(1) The addition of "new anicuts" to rule II, so far as the streams of schedule B are concerned, is agreed to, also as regards the minor streams of schedule A, *viz.*, Nos. 4 to 9.

(2) As regards the exclusion of "new anicuts" across the major streams of this schedule Nos. 1, 2, 3, 10, 11, 12 and 13, your terms cannot be accepted by Mysore, but a compromise is now proposed.

(3) On each of these streams a point to be fixed, above which Mysore should have an entirely free hand as regards new anicuts for direct irrigation, and below which Mysore will undertake no such new works without previous consent of Madras Government.

(4) The points we suggest as suitable are the existing Ramaswami Anicut on the Cauvery, 5 miles above the town of Bannoor,—the road crossing at Honhalli on the Tungabhadra,—and on the Kabbani, the present Rampur Anicut, 10 miles above the town of Nanjangud. The Ramaswami Anicut is some 60 miles above the point, where its river leaves the Mysore frontier, the Rampur Anicut about 70 miles, the Honhalli crossing 30 miles.

(5) The Dewan thought at first that it would be advisable for Mysore to propose a distance limit above the highest anicuts on those rivers in Madras territory, but on consideration thinks the above points will suit Mysore requirements in the future.

(6) The confluence of the Tungabhadra, Hemavati and Lakshmantirtha being above the points named, they need not be specially mentioned here. It is considered that above the points proposed the diversion to direct irrigation of part of the ordinary flow of the streams during the irrigation season, June to December, would but inappreciably affect the supply to anicuts in Madras lower down. I may add that the existing anicuts on the Cauvery and Hemavati above the Ramaswami are so close together that with two exceptions, one on each river, it is not likely that any new anicuts can ever be undertaken and only one seems at all possible

(financially) on the Tungabhadra. Besides, you must remember that all water so diverted finds its way back quickly to the rivers *minus* only the proportion absorbed by or evaporated from the rice fields, and the latter proportion must be comparatively insignificant as the Mysore channels never get far away from the river margins, commanding only strips of steep side-lying lands. Your formulated claim on account of "diminution of supply" caused by schedule C works is more difficult of negotiation.

(7) At the conference at Ootacamund, when a basis for mutual concessions and final settlement was under discussion, both the Dewan and McHutchin believed that any compensation on this account was not thought of as a possible factor in the solution.

(8) In your marginal note on the draft rules then discussed, you say:— "consent to be given to those now far advanced, to be specified, with the under- "standing that if hereafter damage to existing irrigations (sic) (*underlining* is mine) "in British teritory be proved to have been caused by such works, compensation "for same shall be paid." They believed that this was intended to cover damage to Madras works or damage to lands by inundation, that might result from our tanks being breached and the impounded waters suddenly let loose.

(9) It is true (it seems to me) that the wording may be construed truly into meaning, in addition to above damages, damage to existing crops from diminution of supply or to short cropping due to some cause, but this was not understood at the time.

(10) At any rate, to consent to the proposed clause would be for the Dewan to abandon his original and persistent contention that the natural right of Mysore to the utilization of the water-courses can only be restricted when a *material or unreasonable* diminution is caused. Therefore he is not prepared to accede to this addition. Besides, such a clause would always hang "in terrorem" over our heads.

(11) If you decline on your side to abandon future claims for loss from diminished supply, then why not submit the question to arbitration at once? Let it be decided *now*, once for all, whether such claims are admissible, and, if admissible, let the compensation equitably due to Madras, covering all contingencies, be finally adjusted. Mysore would consent to such arbitration nominating two arbitrators on their side, Madras Government to name two, and a Judge of Madras High Court or Resident in Mysore to be Umpire. In fact rule IV to be extended at once to this point in dispute.

(12) I have further only to add that in regard of your proposal to limit the claims to "within ten years of the completion of the work," the Dewan thinks that such a limit of time would be of inappreciable benefit to Mysore, while Madras could ordinarily claim relief against a *material* diminution of only such supply as may have been received by their works during the twenty years preceding the completion of the works complained of. The idea of allowing *no diminution whatever* is, we believe, wrong and against the law on the subject.

XI.

Demi-official—from G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

To—Col. C. BOWEN, R. E., Chief Engineer, Public Works Department, Mysore.

Dated—Ootacamund, the 11th August 1891.

Your letter without date received yesterday.

(*a*) We agree to proposals in paragraphs 2 (commencing "the addition of new anicuts") to 7 ending "as the Mysore channels never get far away from the river margins, commanding only strips of steep side-lying lands").

(*b*) We agree that it is advisable to get the *admissibility* of claims for "diminution of supply" caused by the three new reservoirs, to which we have persistently and consistently objected, decided as soon as possible, but we think it better

that it shall be decided by the Government of India than referred to a somewhat unwieldy court of arbitrators.

(*c*) We do not see how the *amount* of such claims (*if decided to be admissible*) can be stated and considered till after the works in question have been finished and brought into operation, but we would agree to submit our claims, if any, to the Government of India within a "reasonable" time (to be settled between us) after the completion of the works.

2. I think you will see that we have gone as far as we can to meet you, in our desire to bring the matter to a definite issue, and *that*, we hope, has now been secured.

XII.

Demi-official—from G. T. WALCH, ESQ., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

To—Col. C. BOWEN, R. E., Chief Engineer, Public Works Department, Mysore.

Dated—Godavari, the 25th November 1891.

The Resident is rounding us up about replies to communication about certain tanks which will be affected by whatever may be the outcome of our discussion about irrigation disputes. We of course are awaiting your reply to my demi-official of 11th August, which we hoped would bring the matter to a speedy and satisfactory issue. Please let us know what has been or is being done.

XIII.

Demi-official—from Col. C. BOWEN, R. E., Chief Engineer, Public Works Department, Mysore.

To—G. T. WALCH, Esq., Joint Secretary to the Government of Madras, Public Works Department (Irrigation Branch).

Dated—Bangalore, the 3rd December 1891.

Yours of 25th ultimo to hand this morning.

On 16th September last I drafted a letter on the subject of our irrigation controversy to the Resident, which draft I only received back from the Dewan two days ago. It was passed, but he wishes to see the rules, and schedules, which have to be altered a little, before they are finally despatched.

This will delay matters a little longer, but I am doing my best to push the question through.

XIV.

G. O. No. 162 I., dated 18th February 1892.

Read—the following paper:—

Letter—from General Sir H. N. D. PRENDERGAST, R.E., K.C.B., V.C., Officiating Resident in Mysore.

To—the Chief Secretary to Government.

Dated—Bangalore, the 15th January 1892.

No.—144—346-90.

With reference to correspondence ending with your letter, Political No. 636, dated the 16th December 1890, I have the honour to forward, for the formal acceptance of the Government of Madras, a copy of the rules and schedules regarding the restoration and construction of Irrigation works in Mysore, prepared by the Mysore Durbar, which embody the arrangements which have been come to in an

informal manner both by personal discussion and demi-official correspondence between the Chief Engineer, Madras Irrigation Branch, and the Chief Engineer in Mysore.

2. I shall be glad to be informed if the Madras Government agree with the rules proposed.

No. 3-1, dated the 4th January 1892.

3. A copy of Colonel Bowen's letter on the subject is enclosed for information.

Enclosure.

Letter—from Col. C. BOWEN, R.E., Secretary to the Government of Mysore, Public Works Department.

To—the Assistant to the Resident in Mysore.

Dated—Bangalore, the 4th January 1892.

No.—3-1.

With his letter No. 1 A. of 10th June 1890, the Dewan submitted to the Resident a memorandum on the subject of the restoration and construction of irrigation works in Mysore, the right to effect which without restriction had been disputed by the Madras Government. In that letter he urged the Resident to represent the matter in full to the Government of India, in view to a settlement of the points at issue.

2. Colonel Sir Oliver St. John informed the Dewan in April last that the Government of India would prefer the matter to be settled, if possible, by some understanding between Madras and Mysore, and, before leaving Ootacamund this year, he arranged for a conference between officers of the two Governments. Under such circumstances the Durbar again made endeavours, in conference with the Madras Government, to arrive at an amicable understanding regarding our future irrigation operations, so that controversy might be obviated in regard of individual works and a sphere of operations declared in which Mysore projects should be absolutely untrammelled. At the same time restrictions to be accepted by the Durbar on certain classes of works on certain rivers and in certain valleys which might affect prejudicially Madras works beyond the frontier.

3. The rules and schedules which I now forward embody the arrangements which have been come to in an informal manner by personal discussion or by demi-official communications, and I am desired to request you will be good enough to move the Resident to now obtain from the Government of Madras their *formal* acceptance of the same. They will then be adopted by Mysore for future guidance of the irrigation officers.

4. Annexed to the final rules and schedule is printed the demi-official correspondence which led to the modification of the rules after they were first framed and discussed at Ootacamund in May last. These letters will show that the general terms of the settlement have, with one exception, been informally agreed to by both Governments.

5. The exception I allude to is that referred to in the secondary clause to rule V. The decision of the Government of India will be necessary on that point, *viz.*, the existence of a liability on the part of Mysore on account of three large reservoirs now actually under construction, and, if such liability exists, the extent of it; but the definite acceptance by Madras of the rules and schedules as now drawn up is desirable before the controverted cases are specially referred.

No. 112.

Transferred to the Public Works (Irrigation) Department.

J. F. PRICE,
Chief Secretary.

21st January 1892.

22

Order—No. 162 I., dated 18th February 1892.

Ordered that the following letter be sent.

(True Extract.)

G. T. WALCH,
Joint Secy. to Govt., P.W.D.
(Irrigation Branch).

To the Chief Engineer for Irrigation,
with copy of draft letter to the Resident.
„ the Political Department, with draft letter to the Resident.
„ the Superintending Engineer, III Circle.
„ other Superintending Engineers.
„ the Revenue Department.

Annexure to G. O. No. 162 I., dated 18th February 1892.

Rules defining the limits within which no new irrigation works are to be constructed by the Mysore State without previous reference to the Madras Government.

[Printed as Enclosure to Exhibit Ma. 2.]

XV.

Letter—from the Chief Secretary to the Government of Madras.
To—the Resident in Mysore.
Dated—the 17th March 1892.
No.—192, Political.

With reference to your letter No. 144—346-90, dated 15th January 1891, I am directed to say that the rules and schedules in connection with the restoration and construction of irrigation works in Mysore forwarded therewith are accepted by the Madras Government.

Exhibit Ma. 12.

REJOINDER OF MADRAS.

PART VI.—FACTS AND ENGINEERING ARGUMENTS—SECOND ISSUE.

Prescriptive Rights.

1. Madras deny that their prescriptive rights are limited by any area, but claim that their prescriptive right is the extent of the natural flow of the river up to a specific limit.

Reference-Mysore paragraph 23.

The second issue which is that under consideration confines the matter to fixing the limit flow at the Upper Anicut.

Area of Madras Irrigation.

2. As stated above, the Madras Government deny that their prescriptive rights can be measured or limited by consideration of area irrigated. It is limited by the methods and quantity of user, and Madras has a right to the benefits immediate or prospective of any economies which, by means of remodelling works, constructing new works or otherwise, she has been able to effect.

Reference-Mysore paragraph 24.

It has frequently happened that improvements to works are financially possible only by reason of the extension of irrigation obtained thereby. The projected Metur reservoir will give sufficient water for the existing irrigated area from a much smaller total flow than is now required, but that project will be financially impossible unless a large area of land is newly brought under irrigation. The Mysore contention is that, as soon as the reservoir is completed, the quantity of water to which Madras have a right is at once reduced to the quantity required under the new conditions for the existing area of irrigated land. In other words, Mysore is to have all the benefit of the Madras expenditure. The argument has only to be clearly stated to be rejected. Madras do not claim any more water than is theirs by prescriptive right, but they do claim in the most emphatic terms that they are free to use the water to which they are entitled in the way that seems best to them. The converse of the Mysore argument is that, if Madras allowed works to fall out of repair and the quantity of water required for the irrigated area was thereby increased, Madras would be entitled to the increased quantity.

3. It is admitted and has all along been stated that as regards areas irrigated above the Upper Anicut and in the tributaries of the Cauvery the figures given in the Metur Project were erroneous.

Reference-Mysore paragraph 25.

The figures were of no importance so far as concerned that project and were merely inserted as part of the general description of the Cauvery. A search in the old records of the Cauvery Project office has failed to show from where the figures were abstracted.

4. The first note sent to Mysore on the subject of their application for assent to their project reproduced these erroneous figures from the Metur Project reports, which has just been printed and it was not until this arbitration was under correspondence that any check of the figures was made.

5. The figures in the table given by Mysore are misleading both in respect to the way in which they have been tabulated and in the statements made.

6. *Considering the first line "Irrigation under the Cauvery and tributaries."*—The figures in column 2 are not what is represented in the Mysore statement; they are the latest figures given to Mysore on 20th October 1913. The figures in column 3 are those from the same statement.

A reference to this statement (Appendix XV) is invited. It shows areas irrigated (compiled from special reports made by Collectors) in the years 1890, 1895, 1900, 1905 and 1910. This information was asked for by Mysore. The remarks specifically show that with regard to the year 1890 information as regards areas is not forthcoming as regards certain channels. For all the other years full information is given.

Mysore has altogether ignored these remarks and represented that the total area irrigated in 1890 was limited to the area for which figures are given. This is denied and is absolutely contrary to fact.

A consideration of the statement of areas will show that the variations in areas which have occurred are of the nature of seasonal variations. All the works are old ones, though minor improvements such as building new supply sluices and improvements in regulation have no doubt been introduced here and there, but the water entering the channel heads has not been increased and any increases in area are of a minor nature due to gradual petty improvements and due to economies thereby effected.

It is denied that, saving such minor and scattered increases due to minor improvements and economies, there has been any increase in the area irrigated above the Upper Anicut and further that such increases have caused any increase in the quantities of water used or to the customary user.

Generally the variations in areas are merely seasonal variations.

In comparison with the areas under consideration the variations under all heads are insignificant.

7. *Irrigation under the Cauvery.*—As regards the second line, the matter of the original mistake in the Metur Project report from which the figures in column 2 are extracted has been fully dealt with. The area now put forward, 96,500 acres, is a fluctuating one as the quantities of water from year to year and incidence of flow vary greatly. The mode of user remains the same and the prescriptive right is only limited by this and whatever quantities can under such conditions be diverted on to the lands to be irrigated.

8. *Lower Anicut irrigation--the third line.*—The variation in areas is due to seasonal fluctuation of which a diagram has already been furnished. The figure in column II, which is from the Metur Project report, is only approximate and is rather below the average. The area, 112,000 acres, in the Madras case is put forward as a fair figure in view of the actual areas. These areas extracted from Administration Reports are shown in Appendix V to Sir J. Benton's note of May 1911 (page 50, Ma. 8-a).

9. *Veeranam tank—fourth line.*—The area, 52,000 acres, was reported by the Superintending Engineer of the Seventh Circle. It is the area which appears in the Madras Government order sanctioning the estimate for widening the Vadavar.

In the Government Order quoted by Mysore in which the area is stated as 45,000 acres, a reference has been made to the Revenue Department to report on the matter. It is pointed out that, so long as the total Coleroon irrigation is not affected, the removal of 6,000 acres from the category of Veeranam tank to that of area altogether dependent on direct flow does not affect the questions under settlement in any material way.

Reference-Mysore paragraph 26.

10. The statement of Mysore that 176,334 acres were cultivated by Madras above the Upper Anicut prior to 1890 is no doubt true, but the inference is not clear. If the suggestion is that the area either in 1890 or prior to that was limited by this figure, this is denied. It is denied that there is an increase of area of 32,000 odd acres. It is denied that any deductions for new irrigation above the Upper Anicut should be made from the limit flow at the Upper Anicut to which Madras has a prescriptive right and it is denied that the mode and quantity of user above the Upper Anicut has been increased by any such extensions of irrigation.

Quantity of water required.

11. The Madras Government do not put forward a claim for any definite quantity of water but claim the whole natural flow up to a specified limit.

Reference-Mysore paragraphs 28 and 29.

The total quantity will vary according to season, but the limit claimed remains the same.

12. The claim of Madras is for the limit flow at the Upper Anicut to which she has a prescriptive right; the question of distribution of that flow is one which is altogether a matter for that Government. The flow to which Madras has a right will not always be distributed in the same way and the rights are not altered or diminished by such alterations of works as may make a different distribution of flow practicable and desirable.

Reference-Mysore paragraph 30.

The distribution of the limit flow claimed is not proposed to be allocated by a hard and fast rule to 2,300 million cubic feet to the Cauvery delta and 644 million cubic feet to the Coleroon system.

The limit of 7 feet passed over the Cauvery Dam is frequently intentionally exceeded and extra supplies have been passed into the Cauvery delta in the past and the same practice is proposed in the future.

Requirements of the Cauvery Delta.

13. The Madras claim is to a limit flow which under the conditions prevailing prior to remodelling the Upper Anicut was required to produce a flow of 7 feet over the Cauvery Dam with undersluices closed, or 6½ feet over the Cauvery Dam with undersluices open.

Reference-Mysore paragraph 31.

14. It is admitted that the 7 feet limit was only accepted provisionally by Mysore for the smaller scheme to which Madras have assented on certain conditions. The rules required to protect Madras interests under conditions involving the large reservoir and draw-off for new irrigation six times the area proposed under the smaller scheme obviously require not less onerous obligations as regards Madras interests.

Reference-Mysore paragraph 32.

The strict prescriptive rights of Madras are the same under all sizes of work proposed by Mysore.

15. While the tentative nature of the acceptance by Mysore of the 7 feet limit is admitted, it is denied that the Durbar's officers were induced to accept this through the mistake made by Sir J. Benton as regards the alteration of the gauge at the Cauvery Dam.

Reference-Mysore paragraph 33.

The fact that this statement was erroneous was explained to the late Chief Engineer, Mysore, by the Hon'ble Mr. H. E. Clerk, when discussing the matter at Ootacamund in the summer of 1911. The mistake was pointed out to Sir J. Benton in demi-official letter No. 441-11—I. of 18th September 1911, and it is there recorded that this had been explained to Mr. Visvesvaraya (Appendix XVI).

16. This is further distinctly stated in paragraph 3, page 3, Volume III of the Metur Project report; as pointed out by Mysore in paragraph 35 there is no question about this.

Reference-Mysore paragraph 35.

17. The Bhavani Reservoir Project has never been accepted either by the Chief Engineer or by the Madras Government and it has been ordered that it shall lie over.

Reference-Mysore paragraph 36.

Any specific facts and records of observations, discharges, etc., have been placed at the disposal of Mysore and the opinions of Mr. Larminie or other officers who have written on the subject are merely of the nature of expert opinions, and

can be produced on every subject. The prescriptive rights of Madras are to be decided on facts, that is, on records of actual gauge readings, and of rules regarding the limits of water to be passed; and opinions of individual officers who have written from time to time throughout the last 60 years on the subject of the Cauvery delta supplies have not been brought forward or quoted in the Madras case. Reference to old papers, etc., has been confined to descriptions of existing works and statements of fact, and opinions of various officers with regard to the limits of discharges and useful supplies have not been made any part of the case.

18. It seems futile to rely on the opinion of any officer who wrote in 1900 as to whether the maximum useful limit of depth on the Cauvery Dam was 6 feet or less when the rules of regulation actually in existence at the time, and during all the period from 1896 to the present date, have forbidden the opening or keeping open of any sluices in the Upper Anicut with less than 7 feet passing over the dam.

Reference-Mysore paragraphs 34 and 37 to 39.

The value of evidence of opinion in such connection may be gauged by imagining what weight would be given to evidence that some officer, however distinguished and reliable, had expressed the opinion that 8 feet should be maintained, or was recognised as the full useful supply of the Cauvery delta, in the face of an actual practice of passing 7 feet which practice was confirmed by rules of regulation.

The expression of opinion as regards 6 feet has precisely the same value and would only be of value in the absence of evidence of actual gauge readings and rules of regulation.

19. The fact that the top level of the new shutters of the Upper Anicut when closed was fixed 2 feet higher than the previous crest level of the old anicut, certainly does not prove that 6 feet was the full useful supply for deltaic irrigation; on the contrary it proves that it was considered desirable to be able to force a depth of water over the Cauvery Dam up to a maximum of 8 feet showing that 8 feet was considered the maximum useful supply likely ever to be required.

Reference-Mysore paragraph 39.

The cutting down of the crest of the Upper Anicut by 4 feet also shows that the 6 feet level was rather fixed and limited by considerations of flood conditions and was not the measure of maximum level of useful supply of water required over the Cauvery Dam. Flood conditions prohibited raising the Upper Anicut. Raising the anicut by 2 feet or even 1 foot would almost certainly have produced in high floods most disastrous results and the considerations limiting the height to 6 feet are quite apparent. The rules and records of actual regulation clearly show that use was made, for supply of the Cauvery delta and for scouring sand, of the limit quantity of water claimed by Madras whenever it was available except occasionally after heavy rain, generally in the north-east monsoon.

20. The chief evidence of the limit quantity of water which was used and enjoyed by Madras in the Cauvery delta is the record of gauge readings of depths of water actually passed over the Cauvery Dam and the quantity necessary under the conditions prior to remodelling to enable this to be passed.

Reference-Mysore paragraph 40.

21. From examination of the record of actual depths passed over the Cauvery Dam and the river conditions under which the rules of 1882 were framed shows that there was under the then existing conditions a great probability of any fresh giving a gauge of 6½ feet increasing to a flood of such dimensions as to cause damage in the delta. The Cauvery and Vennar regulators were not in existence, and these floods passed through the open heads of these rivers without restriction.

About 8 feet is the flow which could be passed without inconvenience into the delta rivers and channels and which might be regarded as the maximum flow ever useful.

An examination of the record of gauge readings (Part III, Appendix VI. Ma. 9) shows that between 1882 and 1895, under the operation of these rules, out of 89 occasions on which the Cauvery Dam gauge rose as high as 6½ feet, the freshes rose to 7 feet or over 67 times and to 8 feet or over 40 times.

22. The rules were framed under considerations which rendered it desirable to steer between the evils of deficient and excess flow—*vide* Part II, page 8, paragraph 30 (Ma. 8)—and the great liability to excess flow is shown from the actuals quoted. This is doubtless the reason why the closing of the under-sluices was, under these rules, at a lower level than that fixed for opening, as the delta could better spare water after receiving a good fresh than before, while water used under such conditions is more efficient for the purpose of scour —*vide* remarks below (paragraphs 26 and 28).

23. Further, under the 1882 rules, from 1882 to 1895 the average number of days on which 7 feet or over was actually passed over the Cauvery Dam under the operation of these rules averages 34 times a year, with liability to excess supply on frequent occasions.

Under the conditions after remodelling and the rules since then in operation, the average number of days on which 7 feet or over passed the Cauvery Dam is 40 yearly, but the liability to over-supply is now non-existent except on rare occasions.

24. Under these conditions it is maintained that the rules certainly do not show that the maximum useful supply is below 7 feet limit, having in view the absence of means of control of floods in excess of delta requirements. The happy mean as regards supply, which was aimed at under the circumstances, may best be judged from what regulation was instituted for supply of the same areas as soon as means of efficient control became available. This evidence is afforded by the gauge readings from 1902 and rules of 1902, and 1905 and which aim at generally maintaining a flow of 7 feet over the Cauvery Dam whenever possible, some extra supplies being passed occasionally, and especially in August and September.

25. The rules of 1882 define "Scarcity" as a condition in which there has not been a gauge reading of 6 feet for a week. Under such conditions it is laid down that the 7 feet must be passed over the Cauvery Dam before any water is used for scouring. This clearly proves that 7 feet is certainly not in excess of the maximum useful supply while in practice the effect of this rule was that the opening of the under-sluices was actually delayed till 7 feet was passing over the Cauvery Dam on 36 occasions out of a total of 62 (*vide* Exhibit Ma. 9, paragraph 8).

On the occasions when opening was not delayed an equal quantity of water was used for scour combined with supply, as would be used with a 7 feet gauge without scouring. It is obvious that, if scouring was a necessity, water must be used to carry it out. That scouring was a necessity is proved by the fact that it was necessary to alter the Upper Anicut after construction in order to construct scouring sluices.

26. The effect of a quantity of water used for scour is greater, the less the section of approach, that is, the less the water flowing in the river; and therefore delay in opening scouring sluices till a higher gauge was realised would have had the effect of less and not more efficient scour.

Reference-Mysore paragraph 41.

The interpretation of the rules suggested is against the reading of the rules.

Thus, a flow of 4,000 cusecs with a gauge reading of 6 feet would probably do as much scouring as double that quantity with an 8 feet gauge, while the former condition would occur much more frequently.

27. The statement of Mysore that under-sluices were only opened at 6½ feet because it was wished to maintain 6 feet level, is absurd. If this had been the intention, the rule would have been to open the sluices gradually so as to maintain water as near to 6 feet as possible. Under such rule the water surplused over the anicut and *useless for scour* under the actual rules would have been utilized for scour and been equally useful afterwards for irrigation at the Lower Anicut. Had the intention been to maintain 6 feet, the rule would obviously have been of the nature it is now when the intention is to maintain 7 feet (*vide* Appendix I, Part III, Rules of 1905). The rule reads "The normal supply of the delta is 7 feet on the Cauvery Dam north gauge and this level should be maintained as long as possible by raising or lowering the anicut shutters." This is the obvious form of a rule framed to attain as far as possible a limit gauge reading without exceeding such reading.

The rules were framed with a view of using water for scouring whenever it could be spared. The probable considerations leading to the framing of the rules are described in Ma. 8, Part II, paragraph 30.

28. It is further suggested by Mysore that the rule enjoining no scouring after periods of scarcity until a depth of 7 feet was passed over the Cauvery Dam was altogether on account of the requirements of scouring and the increased head obtained for scour with such a depth.

Reference-Mysore paragraph 41.

The fact, however, is that the head (being the difference of level between the head and tail water) was under then existing conditions actually decreased as the gauge reading on the Cauvery Dam increased.

The following are the figures of afflux recorded :—

Gauge Cauvery Dam	Afflux	
	North branch	South branch
	FT.	FT.
6 feet	... 5·60	5·25
6½ „	... 4·56	4·37
7 „	... 4·29	3·85

Thus, the head is actualy decreased as the water rises while the section of approach is increased and scour is much less efficient with 7 feet than with 6½ feet and with 6½ feet than with 6 feet. This has been and probably was a reason for delaying closing the sluices but it certainly was not a reason for delaying opening.

29. The quantity of flow in the Agunda Cauvery required under the conditions existing before remodelling under different conditions of scour and water level is noted below in millions of cubic feet per day :—

Gauge	Over Cauvery Dam	Over anicut	Through under-sluices	Total
6 feet	1,625	86	669	2,380
6½ „	1,950	366	725	3,041
7 „	2,300	644	sluices closed.	2,944

It will be seen that even with the 6 feet level and under-sluices open which Mysore represent as the limit flow under the rules of 1892, the amount of water passed is 2,380 million cubic feet which is slightly more than will give 7 feet on the Cauvery Dam under the conditions subsequent to remodelling. This is under the interpretation given by Mysore to the rules of 1882. Madras, however, altogether deny that the rules of 1882 are limited by 6 feet, and the rules themselves as well as the record of the results of applying them fully bear out this denial.

30. Whatever ambiguity there may be about the limits of the rules of 1882, there is none about those of 1896 or subsequently in which 7 feet is the minimum height of water at which any sluices may be opened and the direction is to maintain 7 feet or more as long as possible.

Reference-Mysore paragraph 42.

The reason suggested for this by Mysore, namely, that more efficient scour is obtainable under these conditions, has been already refuted in paragraphs 26 and 28.

31. It is to be recognised that the necessity for scouring was provided for in these rules and that allocation of water for scour was very necessary and it is a nice matter for consideration at what stage water could be spared for this from irrigation requirements. This is a matter on which the best engineers might well differ, and it is possible that Colonel Smart would not have originally proposed the rules of 1882 even under the then existing conditions (under which the Cauvery-Vennar regulators were non-existent and flood water could not be excluded from the delta).

Reference-Mysore paragraphs 41 and 42.

32. It is, however, submitted that water for irrigation and for scour were both subject to legitimate use and enjoyment, and Madras in no way loses the

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prescriptive right to the total because at one time the distribution between the two water users, *viz.*, irrigation and scour, was varied. Further, the scour water was again used for irrigation of the Lower Anicut system.

33. The heading of paragraph 43 of the Mysore reply is not understood. The regulation has been made in accordance with the rules of 1882 throughout the period under consideration, *viz.*, 1882 to 1895. Paragraph 30, Part II, Ma. 8, to which Mysore refer for their instances of "*non-operation of rules*," shows an abstract of actuals which resulted from *operation of the rules* and thus shows that the nature of user under the operation was such as to constantly require the passing of 7 feet over the Cauvery Dam before opening the scouring sluices, although this was to the detriment of the scouring service.

Reference-Mysore paragraph 43.

34. The "150 yards calingulah" was built at the same time as the Cauvery Dam, and its object was to help to relieve the Cauvery floods which were found to be excessive after the construction of the Upper Anicut and before the construction of the Cauvery Dam. Its effect was to supplement the surplusing power of the Upper Anicut and thus to pass down the Coleroon a greater quantity of water than the original construction provided for. The necessity for its construction is a proof that it was flood conditions rather than depths of supply which could be usefully used which was the consideration fixing the maximum level permissible for the Upper Anicut. Without the 150 yards calingulah it would have been necessary either to lower the Upper Anicut or to build more under-sluices. The former would have been disastrous as regards supply and the latter more expensive than building the calingulah.

Reference-Mysore paragraph 44.

The crest level was fixed to agree approximately with that of the Upper Anicut.

Writing a descriptive note in 1873 on the delta, Major Oakes says with reference to this.—

"At three miles a weir called the 150 yards calingulah provides for the "discharge of water when the water level at the Cauvery head is at about 6 feet "3 inches and when 32,130 cubic feet per second are entering at the Cauvery "head."

35. *Grand Anicut conditions.*—Mysore states as regards the Cauvery and Vennar, "any limit of flow fixed at the head regulators of these two rivers should therefore represent the full requirements of the whole Delta system."

Reference-Mysore paragraphs 45 to 49.

This is a reasonable statement, allowing for sand scour at the Grand Anicut, draw-off for irrigation between the Cauvery Dam and the Grand Anicut, and surplus over the 150 yards calingulah and involuntary losses by percolation. It is necessary therefore to examine what is imposed by the rules of 1892 as the "limit flow" allowed into the Cauvery and Vennar.

36. The only restriction under the rules limiting flow, other than the gauge readings in rear, is that water must not be allowed to head up on the shutters of either work more than 4½ feet above water level in rear.

These restrictions do not operate therefore when there is less than 4½ feet difference of level between the front and rear gauge reading on the Cauvery and Vennar regulators. Apart from such restrictions, the maximum water levels to be admitted to Cauvery and Vennar under the rules of 1892 before surplusing over the Grand Anicut are.—

To Cauvery up to 7½ feet on rear gauge = cusecs 30,700 (about).

To Vennar up to 8 feet on rear gauge = cusecs 10,450 (about).

It will be seen therefore that, under the rules quoted by Mysore, so far from water levels in Cauvery and Vennar being restricted to levels connoting a supply of 11,242 cusecs and 6,104 cusecs, quantities exceeding these by over 100 per cent were as a matter of rule and regulation ordered to be passed down whenever the flow of the river above was such as to supply this.

37. Reference to the table of gauge readings, Appendix VIII (Ma. 9), will show that, in fact, such supplies were passed constantly during times when the

4½ feet restrictions were not in operation. In the face of the executive orders of regulation, it is quite clear that the first rule, which is of the nature of an opinion or preamble, cannot mean that the quantities stated in it are the maximum useful supply to be passed, and the obvious interpretation in view of the very fluctuating character of the river is that the rule expresses views as to the *average supply* considered sufficient. This is quite obvious in view of the context. Any other interpretation makes the executive directions of the rules conflict with the opinion expressed in Rule 1, which as a fact is a reasonable figure of *average supply* and appears constantly in correspondence as the "*theoretic supply.*" That the rules regarding full supply were taken in this sense in the Madras Cauvery Project is quite clear from Volume III, table page 36, "Remarks," in which these figures were taken to mean "average monthly flow" and not limit of daily flow required.

38. Again, the fact that Rule 2 gives a table showing distribution in proportion of 3 to Cauvery to 2 to Vennar up to a total of 23,140 cusecs as compared with the "full and ample" 17,344 cusecs further clearly shows that this refers not to a *daily supply limit* but to an *average supply.*

39. Above these levels denoting a flow of 23,140 cusecs, the proportion is abandoned and extra water is passed into the Cauvery, almost to the exclusion of the Vennar, and this is no doubt due to the exigencies of the regulation of the falling shutters on the anicut. It is impossible from these rules to deduce at what stage of flow in the Cauvery the water passed in, exceeds "useful supply."

As soon as the Grand Anicut was remodelled this condition of uncertainty vanishes, for regulation and diversion of the water at will becomes possible without consideration of conditions imposed by "falling shutters" and it is by examination of the conditions of regulation after 1902 that we can gauge from records of flow in the Cauvery and Vennar what depths were passed down *with intention and without reference to flood conditions.*

By further considering the successive rules for regulation at the Grand Anicut and studying the actual flow passed into the Cauvery and Vennar, it is possible to understand the rules and to get full information regarding the quantities of water passed *for purposes of irrigation use* into the Cauvery and Vennar, and it will be realised that such supplies agree within reasonable limits with the supplies passed over the Cauvery Dam and claimed as prescriptive right by Madras.

40. Considering the rules of 1902, which are the first rules issued after the fitting of lift shutters on the Grand Anicut, it will be seen that the whole year is divided into two seasons called the flood and non-flood seasons.

Reference-Mysore paragraph 50.

The non-flood season refers only to periods when the supply is less than what is called "full supply", *viz.*, 4½ feet Cauvery (13,000 cusecs) and 8 feet Vennar (10,450 cusecs) : total, 23,450 cusecs.

So far therefore from this being considered a maximum supply, the rules of regulation provide that, when the whole flow is less than 23,450 cusecs, turns must be commenced, dividing the flow between the two rivers on specific days. The rules relating to "flood season" apply to all conditions in which total flow above the Grand Anicut exceeds 23,450 cusecs.

The rules in all such times specify that, subject to restrictions named below, before any surplusing through the Grand Anicut is allowed, the following amounts of water shall be carried :—

In Cauvery up to 6·2 feet rear gauge	=	20,640 cusecs (about).
In Vennar up to 8 feet ,,	=	10,450 cusecs (about).
Total ...		31,090

When these limits are attained, the undersluices of the Grand Anicut are to be opened and only after this is done and further rise takes place are the main shutters of the Grand Anicut to be lifted to any degree.

From this, it is perfectly clear that useful supply was considered to be not less than 6·2 feet in the Cauvery and 8 feet in the Vennar, a total discharge of 31,090 cusecs. This is equivalent to a normal discharge over the Cauvery Dam, allowing

for surplus over the 150 yards calingulah, of about 7½ feet, making no allowance for other losses in transmission.

Under the rules of 1902 therefore water up to 31,090 cusecs had to be passed as a matter of rule into the Cauvery delta before any was passed through the Grand Anicut.

The so-called "full supply" of 23,510 cusecs was only useful as marking the stage below which "turns" commenced.

41. Again, the rules of 1905 and 1909 alter regulation and start with a standard to be maintained by the subordinate staff in absence of special instructions from the Executive Engineers.

The standard is--

	CUSECS.
For Cauvery 4½ feet	13,000
For Vennar 7 feet	7,850
Total ...	20,850

The rules specially intimate that, subject to certain restrictions as regards floods and as regards head of water on the regulators, Executive Engineers had power to vary the limits at will. The measure of the use and standard of supply passed after 1905 is therefore displayed only by the daily record of rear gauge readings maintained in the Cauvery and Vennar, a table of which is given in Appendix XVII.

42. The restrictions in all the rules—1902, 1905, 1909—as regards floods and head on regulators are similar and provide for restricting water surplused into the Coleroon whenever the front gauge at the Lower Anicut exceeds 13 feet.

Reference-Mysore paragraphs 51 and 52.

As regards head on regulators, the rules provide that six feet shall not be exceeded.

These being the restrictions, and the power of exclusion of water from the delta being, except for these, absolute, it follows that the water passed into the delta is passed in with intention and for use and enjoyment at all times when—

(*a*) the front gauge at the Lower Anicut is less than 13 feet, and
(*b*) the head on sluice is less than 4½ or 6 feet.

In the table given in Appendix II (Ma. 8), by oversight only restriction (*b*) was considered and the 6 feet rule was applied to the whole period in place of 4½ feet for 1900 and 1901 and 6 feet subsequently.

A fresh set of tables, Appendix XVIII, shows the state of affairs in an abstract and also shows the number of days on which it was possible, having in view total supplies in the river, to pass down more than 4½ feet in the Cauvery and 7 feet in the Vennar, and the number of days on which advantage of this was taken *deliberately and not under the obligation of restrictive rules.*

It may be noted here that restriction (*a*) does not affect the statement in any of these years as there was no gauge reading of 13 feet at the Lower Anicut throughout the period.

An abstract of the result shows that the Cauvery carried extra water for 343 days out of a possible 570 and only on 11 days was this necessary from flood conditions.

For Vennar, the figures are 296 out of 592 days and this was never the result of flood conditions.

43. These tables show clearly that it has been customary to take at all periods of the year supplies into the Cauvery and Vennar representing a flow of 7 feet at the Cauvery Dam when such a flow is available, and this is done with great frequency especially in July, August and September. It is further pointed out that in these months supplies for irrigation considerably exceeding this limit and diversion up to 7½ feet over the Cauvery Dam is sometimes intentionally practised.

The record of regulation shows that supplies in excess of 7 feet are frequently passed intentionally over the Cauvery Dam from July to September, and a specific

claim based on actual practice and enjoyment on this account was made (Ma. 1, paragraph II-C). This amount is, however, covered by the extra 644 million cubic feet entered in the revised claim (Ma. 3, paragraphs 3 and 4) which will suffice both for this and for specific supply to Lower Anicut system.

It is only in view of this that the claim originally made to a specific supply for this is waived. As regards the rules generally, the fact is emphasised that the rules are only secondary evidence and the *mode and extent of user as displayed by gauge readings are the principal evidence.*

44. It is submitted that, if the mode and extent of user could be shown to be, with intention, materially less than the rules specify, the rules would go by the board.

Similarly, when the rules and the extent of user appear to conflict in the other direction, it is on the latter on which reliance should be placed. The rules have in some cases been badly drawn and they are ambiguous in places, but the evidence of extent of actual user is clear, and not only serves to interpret the rules but altogether supersedes them as direct evidence of Madras rights. The gauge readings at the Cauvery Dam, Appendix VI, Part III (Ma. 9), and at the Cauvery-Vennar regulators, Appendix VIII (Ma. 9), constitute the evidence on which the claims of Madras principally rest as regards supplies and prescriptive rights to water for supply of the Cauvery Delta system.

45. What Major Oakes said in 1873 may be quoted here :—

Reference-Mysore paragraph 53.

"With 6 feet of water at the Cauvery Dam, the water begins to pass over "this weir (the Grand Anicut) where 17,600 cubic feet per second are passing "down the Cauvery but by means of shutters the water can be retained 2 feet "higher when 23,650 cubic feet would pass down the Cauvery."

The 17,600 represented a depth of about 4½ feet in the Cauvery. Yet it is clear that dam stones and shutters had been installed, and were in use in 1874 in order to force 2 feet additional depth (23,650 cusecs) down the Cauvery.

Under the conditions then existing, one of the sources of damage and danger to the delta was damage from high floods, there being then no Cauvery-Vennar regulators which now enable as much water as the Coleroon can carry to be diverted into that river. Yet it is seen that even under these conditions devices were installed to force water up to a gauge reading of 6½ feet down the Cauvery and these devices were such as to actually reduce the surplusing capacity in high floods of the Grand Anicut by blocking the water-way with dam stones. Under the conditions then existing, the forcing down of extra water to a depth of 6½ feet was the only possible use of the dam stones and shutters and had this not been a requirement of irrigation neither dam stones nor shutters would have been maintained.

Is it not perfectly clear from this that more than 4½ feet was in constant and intentional use for the Cauvery irrigation supply ?

The falling shutters installed in 1886 constituted a method of replacing the stones and planks and serving the same useful purpose without blocking water-way as did the former device. The facts of the case make it clear that, in the stone and plank period, every effort was made to pass water up to 23,650 cusecs down the Cauvery whenever possible and this even at considerable risk and disadvantage during times of high flood. The description of the Grand Anicut in 1874 is the strongest evidence that 4½ feet was not the highest useful supply in the Cauvery at that period, and that this supply was not less than that due to 6½ feet, or 23,650 cusecs.

The same holds good to this day and the records of regulation prove this fully.

46. The Cauvery and Vennar are not even now immune from occasional damage from very high floods because the Coleroon is unable alone to carry all flood water; this danger, however, is now rare. It was the construction of the Cauvery-Vennar regulators in 1888 and the closing of the old Vennar head in 1894 which gave the present immunity from floods.

Reference-Mysore paragraph 54.

The remodelling of the Grand Anicut in 1899 did not enable any more water to be diverted into the Coleroon; it, however, greatly facilitated forcing more water down the Cauvery-Vennar, and enabled water to be kept out of the Coleroon which under previous conditions would have passed into it involuntarily. This is the reason why the rules of regulation subsequent to 1899 take into consideration the stage of flow of the Coleroon, whereas those before do not, as there was little power before to regulate the Grand Anicut to suit this. Appendix XVIII shows the occasions on which the Cauvery or Vennar were carried at higher levels than the 4½ and 7 feet from 1900 to 1908 and also the occasions on which the extra height was due to flood conditions or to the limit of head.

47. It is denied that Mysore has proved that 6 feet is the maximum limit on the Cauvery Dam required for the delta. On the contrary, it is claimed that all the Mysore contentions as regards this have been fully rebutted and it has been conclusively shown that it was and is customary constantly to pass into the delta water corresponding to 7 feet over the Cauvery Dam *intentionally and for purposes of supply*, and occasionally to pass additional amounts up to 7½ feet and over.

Reference-Mysore paragraph 55.

It is claimed that the requirements of Madras for the Cauvery delta are represented by 2,300 million cubic feet per day over the Cauvery Dam whenever available, and by occasional additional quantities and that this claim is in accordance both with present requirements and prescriptive right established by long use and enjoyment.

48. The Metur Project does not provide for a uniform supply throughout all the months of the year nor is uniform average half-monthly flow at the Cauvery Dam realised under the limit flow conditions claimed by Madras. Indeed, allowing 30 per cent. extra for the fluctuating nature of the supply, which has been suggested by Mysore as reasonable, the approximate figures of average quantity actually realised under the limit flow claimed are compared below in form of gauge depths and the divergence is wonderfully little considering the one is a completely controlled supply and the other a fluctuating and uncontrolled one (*vide* Ma. 9, page 7).

Reference-Mysore paragraph 56.

—	June		July		August		September		October		November		December		January
Average realised in twenty years.	3·5	5·1	5·7	6·4	6·6	6·0	5·6	5·2	5·1	5·1	5·0	4·4	3·9	3·0	2·5
Thirty per cent. above Metur allowances.	3·5	3·5	6·8	6·8	6·6	6·6	6·5	5·1	5·5	4·7	4·3	4·3	3·6	2·0	2·5

The above is a proof that the incidence of flow under the Madras claims and limits as represented by actual flow agrees reasonably on an average with the requirements, and in addition these represent the conditions of actual use and enjoyment and are thus within the Madras prescriptive rights. The above tends to prove the suitability of the limit rules of Madras when tested by reference to Metur duties.

It is to be realised that the average river supplies in the north-east monsoon are far less than in the south-west monsoon, although the limit flow is the same. The reason is obviously that the limit flow or flow approaching this occurs much less frequently in the north-east monsoon. Mysore has urged on this ground that it is not required, but the table shows that with this limit only reasonable average supplies are realised. It is moreover the basis of actual enjoyment and use.

49. The Metur Project is only a project and of the nature of unbiassed and independent expert evidence, but so far as it goes the duties and limit flow fully support the Madras contentions and the existing mode of use and enjoyment as being eminently reasonable in view of the existing conditions.

50. Mysore exhibit My. 1 states that practically no water is required for irrigation in the first half of June but they have not advanced any proof of this.

Reference-Mysore paragraph 57.

Most of the water passed down in the early part of June is used in filling up the sandy river bed and the loss in transmission at this time is very great. The filling up of the river bed is a necessary antecedent to the full use of the rivers and channels for transport of water and whatever water is used for this purpose is used in the interests of and for the requirements of irrigation although it may never actually run on to the fields. It is true that a high flow is seldom realised in early June but this is no reason why Madras should be deprived of such flow when it is received and the enjoyment of the natural flow within the limits claimed has been her right from time immemorial.

A great proportion of the first fresh of the season must be absorbed in the river bed and this will be clear if it is remembered that the rivers are wide, shallow and with sandy beds in which the sub-soil water is from 1½ to 4 feet below the bed level.

The interstices in sand may be taken as not less that 33 per cent of its volume. Thus, a portion of river, 1,000 feet wide, 1 mile long, will require over 3½ million cubic feet to fill it up, taking the mean depth of sub-soil water to be 2 feet. Water for this has to be supplied by the early freshes which it is now suggested by Mysore are to be impounded if they come early in June because they so seldom come so early.

As a fact these freshes occasionally come in May but it is recognised that in this month the rivers and channels below the Vennar and Cauvery regulators are generally under repairs and that May freshes are not admitted below the regulators.

These May freshes, when they occur, help to fill up the river bed above the Cauvery-Vennar regulators and are useful in replenishing supply to irrigation above the Upper Anicut, and Madras has a prescriptive right to them. The Madras Government, however, are prepared to waive the right to the freshes of May under conditions elsewhere stated but claim their right to the freshes of June up to the limit flow, and altogether deny that these freshes are not utilised when received.

Of the flow in early June, more water is required to fill up the river and channel beds than to give supply to lands and it may be doubted if the allowance of 50 per cent extra for this purpose made in the Metur Project is sufficient even for the low steady flow there provided for, while absorption in the case of considerable freshes would be much greater in the case of the first few days of fresh.

51. The figures in Appendix D no doubt show considerable surpluses over the Lower Anicut in June and on the assumption that they are dependable and represent water coming from above the Upper Anicut, they represent an extraordinary state of affiairs which appears inexplicable.

Reference-Mysore paragraph 57.

The note of Mysore is: "During the first half of June in fifteen years out of twenty the discharges at the Lower Anicut are far in excess of the surpluses at the Upper Anicut."

The figures show this and it appears quite impossible that this should be a fact.

First, taking the years in which there was no discharge at the Upper or Grand Anicut, the discharge at the Lower Anicut is considerable. In 1890 the discharge at the Lower Anicut is larger than the whole quantity which entered the Cauvery and Vennar. It is quite impossible that this could have come from seepage, leakage or surplus of superabundant supply.

The figures in 1892, 1897, 1905 display similar impossible discrepancies.

In 1899 the discharge of the Lower Anicut is more than the whole flow of the Agunda Cauvery. The figures are so discrepant that no arguments can be based on them. What is advanced by Madras is that the records show that, so far as intention is concerned, the register of regulation shows that it is the custom to pass into the delta for use the freshes of the first half of June. It is against all common sense to argue that the flow off the fields or percolation can at such a time of year give any approach to the figures of discharge recorded at the Lower Anicut.

Wherever the water comes from, it cannot possibly be from the Cauvery delta, and the argument that because this water must be involuntary surplus it represents excessive use cannot be maintained.

As regards the second half of June, a great deal of the water shown as surplused at the Lower Anicut would, under the conditions proposed by Madras, be available for impounding in the Mysore reservoir.

The fact that the figures in column 11 exceed those in columns 8 and 9, again points to discrepant and impossible results, having in view the season of the year and the scanty precipitation of rain recorded.

As regards the second half of June, the figures are also somewhat discrepant as regards correspondence between the figures in columns 8 and 9 with those in column 11, but are not so in the sense stated by Mysore.

The total of column 8 and column 9 for the second half of June is 221,475 million cubic feet and of column 11 is 181,001 million cubic feet.

The figures are discrepant in the years 1896 and 1909 as displaying a very much smaller discharge at the Lower Anicut than should be shown from the figures in columns 8 and 9.

To sum up, the figures show such discrepant and impossible results that they cannot be used as a basis of argument.

52. The whole of the Mysore arguments as regards limit supplies are directed to facts which would be relevant and the arguments reasonable if the "limit flow" were "average flow."

Reference-Mysore paragraphs 58 to 60.

In the case of the Metur Project, the "limit flow" and "average flow" for any fortnight is the same as steady supplies are provided. To compare a limit flow which may be realised once or twice or less in a fortnight with a limit flow which is realised every day and all day, is altogether inaccurate and misleading and yet this is what is done by Mysore. A comparison of quantities of flow actually realised under the limit of 7 feet throughout the year, and actually enjoyed by Madras during a period of 20 years, with the quantities provided under the Metur scheme given in Ma. 3, paragraph 10, shows the former about 27 per cent more than the latter, and Mysore admits 27 per cent is a fair allowance to set off against the fluctuating and uncertain incidence of natural flow.

It is shown in Ma. 9, Part III, parapragh 25, that, under the limits proposed by Mysore rules originally put in (My. 1-a), the average supplies for irrigation passed over the Cauvery dam worked out to 42,623 million cubic feet less yearly than was actually realised in the past 20 years under Madras existing rules and system of regulation. The limits originally proposed are now reduced by Mysore, and the objection referred to above with regard to the first figures applies with added force to the revised and reduced standard. The statement that these limits allow from 25 to 30 per cent over the Madras project supplies is altogether denied. What has been raised is the limit of flow which in the Metur Project is a steady flow and in the Mysore proposal a very fluctuating one.

53. The argument used by Mysore with reference to Appendix II of Sir J. Benton's note (page 46, Ma. 8-a) is that because the fluctuations of natural supply are very great and have in many cases fallen below the supplies allowed in the Metur Project for continuous half months, and also occasionally as much as twice to six times these supplies have been passed in a similar period, that material reduction of the limit flow now utilised can be made.

Reference-Mysore paragraph 61.

54. Mysore states that no material loss has resulted from the periods of shorter supplies and this is the basis of their argument. This statement is altogether denied. While remissions on account of total failure of crop from want of water are given, and the remission has amounted in the worst year to over 6 lakhs of rupees representing a loss to the ryots, computed at from 70 to 90 lakhs, it is to be realised that no remission whatever is given for partial failure, that is, poor outturn of crop, and in the case of compounded double crop lands no remission is given unless both crops are total failures.

In years of bad supply large areas raise scanty crops and the average outturn per acre is affected.

It is altogether denied that no loss has been experienced in seasons of short supply from this cause, and the statement is altogether unreasonable, and one which could not be accepted without the strongest proof.

Further, the Madras rights extend to the quantity and mode of user, and are not restricted to the least quantity on which a cropped area might escape from loss or failure of crop.

55. The necessities for large supplies and large limit flow such as are in customary use by Madras are based on the fluctuating character of the river. The greater the fluctuations the less the economy of water possible. Yet Mysore actually contend that these fluctuations are a reason for reducing supplies. Mysore draws from Sir J. Benton's Appendix II an absolutely opposite conclusion to that drawn by that officer himself -*vide* that officer's note, paragraph 12 (Ma. 8-a, page 35).

Reference-Mysore paragraph 62.

It is only by means of a steady and controlled and secured supply that economy is possible, and the proposals of the Metur Project are based on such a system of supply.

56. In the year 1890 a large area of cultivation coincided with a small river supply but a reference to the statement showing distribution of flow of that year (page 16, Volume I, Metur Project) shows the natural distribution of flow approached closely the ideal distribution and in the south-west monsoon was well distributed and in suitable quantity while especially in September and the first half of October (the most critical time) it was ample and well above the average. This accounts for the large area cultivated that year. The precipitation of local rainfall during the year was particularly favourable. There was throughout the season an absence of torrential rainfall and consequent submergence of low lands, but a good and continuous fall of a very exceptionally favourable character (see Metur Project, Volume III, page 50 to 53, column 17).

The conditions of distribution of both river flow and rainfall were extraordinarily favourable throughout the year and this fully accounts for the large area cropped. The fact that a large area is charged as irrigated and that there are no remissions does not prove absence of loss from deficient supply, but in the case of this year the conditions were such that it appears likely that the outturn of crops was satisfactory. The inference deduced from the results of this very exceptional year cannot be accepted as showing that the greater amount of water ordinarily used is excessive.

57. The figure of area irrigated in 1903-1904 should be 976,174 acres and not as stated by Mysore and this is not the lowest area in the range; Mysore has extracted its figure from Appendix V of Sir J. Benton's note in which this figure is wrongly shown as explained later.

It is not suggested that 349,000 million cubic feet is required for the supply of the Cauvery irrigation, and it is not on the incidence of flow in the year of the most continuous and abundant supply that necessities of "limit flow" can be profitably considered.

58. Mysore concludes paragraph 62 with the argument that the yearly supply of 210,920 million cubic feet is a suitable supply for the Cauvery Delta system. If this supply were guaranteed yearly and distributed in general accordance with requirements, it would suffice.

The figure, however, is an average and by no means represents the yearly supply. Indeed, according to Mysore figures (Appendix G), it would only be realised in six years out of 20, while the distribution of supply frequently leaves much to be desired.

The supplies go as low as 132,123 million cubic feet in 1899 as compared with a flow actually enjoyed for the Cauvery delta of 157,199 million cubic feet. The latter flow entailed a loss to the delta ryots estimated at about 1 crore of rupees.

It is clear from the above that the limits of Mysore proposals certainly would not conserve unimpaired the prescriptive rights of Madras.

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59. No logical argument is advanced in this paragraph. The suggestion that the worst recorded flow should be a measure of the requirements and enjoyment of Madras is obviously untenable. The fact of occasional surplus involuntary and otherwise is not denied by Madras nor the reasonableness of Mysore's wishes to impound; what Madras ask is to be fully safeguarded with regard to the prescriptive rights of user already acquired.

Reference-Mysore paragraph 63.

60. In this paragraph reference is given to Appendix G showing comparative statements for 20 years of the quantities which would have been passed over the Cauvery Dam half-monthly—

Reference-Mysore paragraph 64.

(*a*) under the limits proposed by Mysore rules (Appendix E).

(*b*) under the 6 feet limit which Mysore has advanced as the limit of the prescriptive right of Madras for the Cauvery delta at the Upper Anicut.

The Government of Madras do not admit that the 6 feet gauge reading correctly represents the limit of their rights and claim to have proved this.

The table in Appendix G, however, shows conclusively that the limits proposed by Mysore rules (Appendix E) give on every year a resulting flow greatly less than that due to the limit of 6 feet which they themselves advance as the limit flow to which Madras have established a prescriptive right at the Upper Anicut.

A comparison of the totals under the columns in Appendix G is invited as a proof of this.

61. Appendix V of Sir J. Benton's note of 12th May 1911 (Ma. 8-a, page 50) has, as stated therein, been prepared from the Revenue Administration Reports of the Madras Public Works Department, Irrigation Branch.

Reference-Sir J. Benton's Appendix V.

Every endeavour has been made to trace the figures of "Total supply of the Cauvery"—column 10—to these reports but without success as the figures differ greatly from the discharges (diagrams showing discharges of the Cauvery and Vennar) of which, a statement is appended (Appendix XVII). It appears that Sir J. Benton got his discharges by multiplying the duty figures given in the irrigation reports by the average daily discharges and the number of days counted as the period of crop. That is, column 10 = (column 5 × column 3) + (column 6 × column 4) × ·0864. The accuracy of this figure is dependent on the accuracy of the figures in columns 3, 4, 5, 6 in relation to each other. As regards accuracy, all these figures are open to question and the figures in columns 2 and 4 are specially noted as being unsuitable where 123 days has been taken as the period of first crop.

62. The whole of these figures of crop period are on a wrong basis.

The first crop is the small and short one and not as represented the large one. The large crop is a single crop planted out in July to September and harvested in January to March. The first crop of the area shown under "second crop" is planted in June, harvested in September—October. The same area is replanted at once and harvested in March.

This is the general practice but the crops overlap and it is quite common to see transplantation going on in all the months of the year from June to December.

63. The figures which represent the recorded discharges of the Cauvery and Vennar, given in the Administration Reports, are abstracted in Appendix XVII.

These agree with the figures of Sir J. Benton for the years 1907 to 1909. In these years the basis on which the average discharge was computed and that on which the crop periods are calculated must correspond with the average flow basis of computation, whereas this cannot be so in other years.

64. As regards the "areas charged as irrigated"—columns 7 and 8—the figures have been checked against the Revenue Administration Reports and are correct except for the years noted below:—

Years.	From column 7, Appendix V.	*From Administration Reports.
1902-03	941,261	982,356
1903-04	929,819	976,174
1904-05	945,748	989,226

* Page 44, Triennial Administration Report for three years ending 1904-05.

65. The figures in columns 5 and 6 of Sir J. Benton's statement are abstracted from the Administration Reports but there is nothing on record to show how these have been arrived at and every effort to trace the source of the figures has failed.

One thing is, however, quite clear which is that the discharges shown in column 10 of Sir J. Benton's statement do not even approximately represent the discharges of the Cauvery and Vennar from June to January as computed and shown in the figures of discharges for this period in the Madras annual diagrams.

66. As regards the discharge figures appearing in the annual diagrams now reproduced in Appendix XVII, the direction of the Assessor as regards making an examination of the basis on which these rest and the methods of computation has been carried out.

It is found that great and altogether unexplained variations in the earlier years (before 1901) appear from year to year in discharges and the discharges recorded for these years are certainly very erroneous.

As regards the later years the basis of the discharges has been traced but it cannot be said that the accuracy of the figures is confirmed although they are by no means so erroneous as the earlier figures.

67. It must be admitted that the Madras discharges are unreliable and it is proposed that, as was done in the case of the Sivasamudram discharges, the evidence on the subject which is forthcoming shall be laid before the Assessor and whatever modifications of the methods of computation or whatever recomputations are required by him be carried out.

The matter is made the subject of a separate note and it is only here noted that the discharges must be considered unreliable.

68. It is here noted that these figures, although recorded in Madras reports, have never been advanced either for purposes of this arbitration, or in the periodic reports as reliable statements. It was the impossible differences found between the figures of discharges of the Cauvery and Vennar, and of the Cauvery Dam, which were compared in 1909, that proved that the discharges recorded by Madras were not such as to give a reliable record of water supplies for purposes of preparing the Madras Cauvery Project, and it was on this ground that the whole work on the project was postponed for a year and an Executive Engineer was specially appointed to gauge the Cauvery at Bhavani bridge and at the Cauvery Dam throughout the year 1909. The Metur Project is based on the resulting discharges which are established on a reliable basis.

Sir J. Benton in his remarks, paragraph 18, regarding the table, Appendix V of his note, specially brings to notice the admitted inaccuracy of these Madras discharges.

69. The matter is treated at some length in order to show that the Government of Madras have not put forward as accurate figures of discharges which they now repudiate. These figures do not form part of the Metur Project, or of the Madras case, and have not till now been considered or critically examined in this connection.

70. As the figures on which Mysore relies as shown in Appendix V of Sir J. Benton's note are shown to be erroneous, the inferences drawn by Mysore from these figures are not here further dealt with, but it is denied that these inferences are correct.

Reference-Mysore paragraph 64, concluding portion.

It is moreover denied that the question before the Arbitrator is *what supply will adequately safeguard Madras interests.* The issue to be decided is *what limits of flow measured at the Upper Anicut is necessary to conserve the prescriptive rights of Madras unimpaired.*

71. Reductions of supply passed to irrigation are not infrequently made after heavy falls of rain in the months of October and November. It is altogether denied that in the north-east monsoon there is "more or less continuous and heavy rainfall." The falls of rain in the north-east monsoon are of a cyclonic nature and the rain is generally torrential but of short duration. It is generally much the heaviest along the coast and rapidly diminishes in intensity as one goes inland.

Reference-Mysore paragraph 65.

The limitations under which rainfall is useful, combined with the times of transmission limiting the reduction of supplies on account of rainfall, are described in Ma. 9, Part III, paragraph 29. The useful effect of rainfall depends more on its distribution as regards area and incidence of fall than on quantity of precipitation.

The rules suggested by Mysore, Appendix H, are objected to. It has been pointed out that, from the time of fall of rain to delivery of reduced supplies on the fields, six days must elapse. At ¼ inch per day this will use up 1½ inches. Falls over 1½ inches in one day are redundant as regards supply in that they place on fields in one day more than six days' supply. It is only to further falls in the six-days period following limited cumulatively as regards useful effect to ¼ inch on first day, ½ inch on second day, etc., up to 1½ inches on the sixth day that credit could, under any circumstances, be given and to allow this such falls must be widely distributed over the irrigated area, which, it is to be remembered, extends up to Bhavani, that is, some 200 miles from the coast.

While, as an act of grace, it might occasionally be possible to allow Mysore to impound quantities in addition to what is allowed by the rules, on account of continuous and well-distributed rainfall, it is impossible to frame rules which will, while fully protecting Madras, *enforce enjoyment by Mysore* of the rain falling in the irrigated area.

The rules proposed by Mysore are most difficult to work and further assume 2½ inches as the limit of useful rain, which is not admitted. These rules do not afford full protection to the existing rights of Madras, and are in addition extremely difficult of application. It is noted that they do not find place in the third set of provisional rules for the regulation of the Mysore reservoir, put forward as Appendix E.

These rules are already very complicated, and presumably it was found undesirable to include in the already complicated rules the additional provisions required by the system proposed.

The grounds of the suggestion of Mysore that a few years' observation will easily enable rules to be framed is not understood. Rainfall statistics are already available for over 30 years over the whole area affected and a few more years' observation will not assist but merely postpone a settlement.

Requirements of the Coleroon System.

Reference-Mysore paragraph 66.

72. The limit of flow at the Upper Anicut claimed by Madras as being the limit of her prescriptive rights at the Upper Anicut with reference to the irrigation of the Cauvery delta includes a flow of 644 milion cubic feet per day when available over and above the discharge due to 7 feet on the Cauvery Dam. This quantity is the limit of prescriptive right excluding all consideration of the Coleroon system, and only considering the state of affairs in the Cauvery delta and at the Upper Anicut under the conditions existing prior to remodelling that work in 1899-1902.

The Madras Government claim that their action in remodelling has in no way diminished their rights by the improvements made, and they have a title to enjoy any advantage which may accrue from this or any improvements which do not increase the liability of Mysore. The statement that 644 million cubic feet is claimed for Coleroon irrigation is thus not quite accurate. If there were no Coleroon irrigation, the claim would still represent the prescriptive right of Madras.

73. In view, however, of the peculiar conditions of supply of the Coleroon system and of the altered conditions of supply to the Cauvery delta and Coleroon Anicut system, the Government of Madras are prepared to waive their strict legal prescriptive rights for supply of the Coleroon system subject to the admission undiminished of their claim to limit flow at the Upper Anicut. The improvements made by remodelling the Upper, Lower and Grand Anicuts will allow of adequate supply being given under the altered conditions to both systems subject to the limit flow claimed by Madras.

74. The supply of the Coleroon has been always dependent on freshes and floods, but the improvements carried out successively by the construction of the

Lower Anicut and remodelling of the same have diminished the necessity for passing such large floods down the Coleroon in order to give full supply to the system.

Under the conditions of supply already fully described it will be understood that so long as Veeranam tank is not full the supplies to this system are greater or less in accordance with the incidence and magnitude of freshes and that any diminution of a flood entails reduction in the amount of water passed into Veeranam tank.

Under such conditions the flow at the Upper Anicut which will preserve unimpaired the prescriptive right of Madras is only limited by the full natural incidence of flow and flood at all times when the Veeranam tank is not full. The Government of Madras have recognised that such condition of use while covered by existing practice and use is unduly onerous and have restricted their claim as above stated.

75. It is altogether denied that no good purpose would be served by passing into the Coleroon a limit flow of 644 million cubic feet when available. It is, however, also denied that Madras have engaged or proposed to set apart or allocate this limit flow to the Coleroon system. It is also denied that the flow of 644 million cubic feet per day when passed over or through the old Upper Anicut before remodelling was unavoidably run into the sea.

Reference-Mysore paragraph 67.

It is claimed that the whole of this flow was used and required for purposes of irrigation both for the Cauvery delta and also the Lower Coleroon supplies.

76. The irrigation under the Coleroon system varies slightly from year to year. The area is shown in Appendix V, Part III, Ma. 9, and varies from 99,000 acres to 113,000 acres. It has been taken in the Madras arguments as 112,000 acres.

Reference-Mysore paragraph 68 (1).

77. It has been shown that the limit of 1,498 million cubic feet per day is *utterly* inadequate for the supply of the Cauvery delta and that such limitation is altogether at variance with both existing and past practice. The correctness of the inference based by Mysore on this assumption is therefore denied.

78. The supplies to the Coleroon system are adequate *under existing conditions* when the supplies to the Cauvery are adequate, that is, when there is not less than 2,300 million cubic feet per day passing in the Agunda Cauvery at the Upper Anicut. Existing conditions entail passing without any impounding all freshes and floods above 2,300 to 2,600 million cubic feet in 24 hours into the Coleroon.

79. In view of the detailed examinations of the conditions of supply of the Coleroon system made in connection with this arbitration, Colonel Ellis admits that the provision for supply of this system in the Metur Project made by him was inadequate and unsuitable. Colonel Ellis was altogether in ignorance of the very peculiar conditions of supply of this system when he drew up this project. It is not a fact, however, that no provision was made for the Lower Anicut system in the Metur Project (*vide* Ma. 3, paragraph 10).

80. It is, however, again pointed out that any impounding in the Metur Reservoir would be held at the call of the requirements of existing irrigation whose prior rights to water over any new area is fully recognised in the Metur Project. Impounding by Mysore implies total loss and alienation of water hitherto enjoyed by Madras.

81. It is claimed that Appendix K. proves that excessive quantities of water are thrown into the delta system because in certain months when no water was knowingly passed into the Coleroon there was a flow in that river. The months on which the claim is based are not specified. That there is leakage through and sub-soil percolation under anicuts into the Coleroon to a very considerable amount will be visually clear to any one who has seen the works in times when they are not surplusing.

Reference-Mysore paragraph 68 (2).

That there is considerable seepage into the Coleroon from the Cauvery and the fields irrigated under the Cauvery is admitted, although the quantity is unknown. The seepage of water is a necessary incident of irrigation and the existence of a neighbouring stream with a bed at a lower level must always increase such seepage

This makes the necessities of supply greater but does not show excessive supply; on the contrary it proves additional necessities for the lands adjacent to such a river.

A river which is mainly dependent on occasional heavy freshes for its supply, as is the Coleroon, will, during periods of non-supply, continue to flow from seepage of its own bed, and it is to this that the dry weather flow of all large South Indian rivers is to be attributed.

This cause operates in the Coleroon whenever the shutters of the Upper and Grand Anicuts are closed and the 150 yards calingulah is not surplusing. Much of the flow at such times is due to occasional freshes, and the discontinuance of such freshes must very materially reduce the seepage flow of the river which forms a very important part of the supply now passed to the Lower Anicut system.

82. Some of the figures in Appendix K are of a nature which throw very considerable doubt on their correctness.

For instance, in the first half of June 1899, the total flow of the Agunda Cauvery is only 4,696 million cubic feet at the Upper Anicut. It is absolutely impossible that the flow at the Lower Anicut due to this water could have been 2,605 million cubic feet due to leakage, etc.

The leakage would moreover be much more in times of abundant supply after water has been poured into the fields, yet in the second half of July of the same year it is half this amount.

Again in 1905, the figures are for first half of June—

	Million cubic feet.
Total flow, Agunda Cauvery	4,336
Do at Lower Anicut	4,630
Leakage, etc.	4,619

The figures cannot be explained but they are impossible.

The figures used by Mysore are supplied by Madras from the recorded discharges and are the only ones available but only general inferences can be drawn from them. They are not accurate.

There is a considerable catchment area (about 1,100 square miles) draining into the Coleroon between the Upper and Lower Anicuts; but, in the earlier months, June to September, the rainfall in the area is not heavy.

The figures on which Appendix K is based are doubtful, except as regards column 2 which is likely to be substantially correct, and the deductions made from the figures are therefore also doubtful. Whatever the seepage and leakages may be, however, they are unavoidable.

83. The capacity alluded to as "full supply capacity" is the requirement of "direct supply" from day to day of all the channels and even this allows only 935 cusecs, a deficient supply for the Vadavar and Veeranam tank.

Reference-Mysore paragraph 68 (3).

If, however, an average supply of this amount was made available from day to day, this would nearly suffice for the irrigation, the duty figure being a little over 50 acres per cusec.

The supplies are proposed, however, to be given on limit flow and the representation that the limit flow required should be the bare supply which is required each day is obviously fallacious.

84. The conditions of supply as fully explained in the descriptions of the Lower Anicut are not such as to enable all flow received being passed into the channels. These conditions have to be studied and fully considered before any opinion can be formed of what flow is necessary to secure to Madras unimpaired the protection of her existing rights.

Mysore have ignored all these conditions and have suggested moreover that flow should be limited to the average daily requirement although no provision for ensuring the daily supply of this is suggested.

85. Mysore have not fully stated the limit of Madras claims in their quotation from Madras case, Part III, paragraph 15, Ma. 9. What is there stated

is " the limit claimed will give sufficient to supply the Veeranam tank and the Lowèr Anicut system in addition to the Cauvery. The claim made, however, is greatly less than the full prescriptive rights of Madras."

86. It is not a fact that Madras have admitted that the 644 million cubic feet per diem when passed at the Upper Anicut did not help in replenishing the Veeranam tank. The facts, and also the statements of Madras, lead precisely to the opposite conclusion.

87. It is not a fact that Madras have admitted that the old conditions at the Upper Anicut had grown so bad that they necessitated remodelling. Remodelling, however, has been a great improvement and it is claimed by Madras that the enjoyment of the advantage derived from such remodelling is their right and that they should not be deprived of any right previously existing on the grounds of the improvements carried out, which improvements have in no way adversely affected Mysore. The extra 644 million cubic feet referred to will be used by Madras for supply of the Lower Coleroon system, and for occasional extra supplies to the Cauvery system. The statement that it is not to be used for the same purpose (supply of the Lower Coleroon system) as prior to the remodelling of the Upper Anicut is denied.

88. It is admitted by Mysore that in bad years the surplus allowed into the Coleroon is not much under existing conditions. Under the conditions contemplated as regards impounding in Mysore reservoir, these small quantities will all or nearly all be impounded, and no freshes will be passed down the Coleroon.

Reference-Mysore paragraph 70.

Madras have not admitted that the flood discharge of the Agunda Cauvery is "quite under-estimated." What has been stated is that the produced curve of discharges showing high floods probably errs somewhat on the side of safety, that is on the low side. The discharges are not deliberately under-estimated, but a caution which Mysore has neglected to display in preparing its project was exercised in estimating flood discharges in the Madras Cauvery Project.

89. The matter does not appear to be very material to the point at issue, as Madras have waived their prescriptive right to high floods at the Upper Anicut.

90. The capacity of Metur reservoir has no bearing whatever on the case now under consideration, which is, what flow at the Upper Anicut is required to maintain Madras rights unimpaired. It is, however, obvious that water impounded for the protection of a system, even if wrongly impounded, is still available as a protection. Madras deny the inference drawn by Mysore that no specific supply is needed for the Coleroon system.

Under a condition which interferes with the natural discharge of floods hitherto enjoyed, Madras only consent to waive their undoubted prescriptive right to floods for the supply of Veeranam tank in return for an adequate limit supply being accorded sufficient to protect this system and the Cauvery delta system.

91. The grounds on which the claim for 644 million cubic feet are made are not correctly stated—*vide* paragraph 72 above.

Reference-Mysore paragraph 71.

92. The average rainfall at Srimustnam is, between June and January, as stated about 36 inches. This is, however, divided up into falls during June, July and August of on an average 9·33 inches in September, October and November of 22·37 inches, and in December and January of 4·74 inches. The good rainfall is in the months of September, October, November and the catchment is dependent mostly on the north-east moonsoon. The irrigating allowance of Madras for tanks in this zone of rainfall is about 50 to 60 acres per square mile of catchment for small catchments. This, however, diminishes with the size of the catchment.

Reference-Mysore paragraph 72.

The tanks in this area are north-east monsoon tanks and generally commence cultivation in October. The Veeranam tank, having enjoyed from time immemorial an early supply from the Vadavar, commences cultivation in July and derives benefit from the supplies of both monsoons.

The supplies of June to August are mostly river supplies coming from the Western Ghauts, and the supplies from September are largely from the local catchment but also from the Coleroon to a quite considerable extent. The capacity allowed for north-east moonsoon tanks is generally about ·15 million cubic feet per acre irrigated. That would be about 8·25 million cubic feet per square mile of catchment. The capacity of Veeranam tank is 918 million cubic feet or 3·55 million cubic feet per square mile of catchment. Thus the tank, if it had an adequate capacity, might irrigate 60 × 256 = 15,360 acres commencing about October. Owing to its inadequate capacity, it could not irrigate more than about 10,000 acres if dependent altogether on its own catchment and cultivation would commence in October. As a fact it irrigates 52,000 acres commencing in July, a time when the tank is generally without supply from its own catchment. Under the circumstances, it is submitted that the Mysore contentions in paragraph 72 are altogether fallacious.

The reference to rainfed paddy crops refers either to conditions of well distributed rain over 5 to 6 months and in quantities exceeding 70 inches or to inferior qualities of paddy raised as a short crop. The conditions under Veeranam tank ayacut as regards water required is the same as throughout the Cauvery delta and the rights to river water are even older. The Lower Anicut was primarily constructed for the protection of the Veeranam tank irrigation and the Madras rights are to the customary supplies and methods of enjoyment.

93. The assumed duty of 70 is purely arbitrary, while the rainfall on which it is said to be based is only heavy between September and November and is of a very fluctuating nature and of a cyclonic character. During this time river supplies are usually low and but seldom give limit supplies. The occasional river supplies are of a great value in supplementing local rainfall and to these supplies the system has from time immemorial a prescriptive right. The point to be decided by the Arbitrator with respect to the Coleroon system as well as with respect to the Cauvery delta is not what is the minimum supply of water on which it is just possible to raise wet crops without widespread failure, and irrespective of yield per acre, but what is the limit supply of water to which prescriptive right exists in accordance with established method of user.

Reference-Mysore paragraph 73.

94. The rules in force at the Lower Anicut prior to remodelling direct the opening of under-sluices at a level of 1½ feet over north branch; that is, at level + 52·92.

Reference-Mysore paragraph 74.

The under-sluices consist of 16 vents of 6 feet span only in a length of 20,000 feet of anicut with a discharge of 6,318 cusecs. With 1½ feet over the crest the discharge over anicut is about 9,000 cusecs.

The level at which full supply for the direct irrigation of the area under Veeranam tank and the Vadavar could be realised prior to remodelling was 2·56 feet above the south branch crest, that is + 53·56. This is distinctly recorded as a fact in the report of Mr. T. Lobb, Executive Engineer, Coleroon Project Division, in 1886.

95. It is convenient here to restate levels and zeros of gauges from (Ma. 8, Part II, paragraphs 35 and 39):—

Crest levels, old anicut—	
North branch	51·42
South branch	51·00
Crest level new lift shutters when fully lowered	53·42
Zero of Vadavar gauge	45·02
(This was altered in 1905 before the gaugings of 1906 were taken.)	
Reading of the Vadavar gauge corresponding with water just topping the shutters	8·40

It is necessary generally to keep water about ·2 below the top of the shutters as waves spilling over the shutters injure the apron below and no water is allowed to spill over the shutters.

The discharge flowing down the Vadavar with the shutters fully lowered and the water as high as these will hold is that due to 8·2 gauge or 935 cusecs (*vide* Ma. 8, Part II, paragraph 41, page 14).

With a height of 2·56 above the level of the crest of the old south branch (+51·0) the water level was 53·56 which connotes a gauge reading Vadavar gauge of (53·56 −45·02)=8·54 and a discharge of 1,030 million cubic feet. It is probable in the time of Mr. Lobb in 1886, that the Vadavar, which has been steadily silting up, gave a greater discharge than the gaugings of 1906 record. It is considered probable that when the rules in force prior to remodelling were first framed that the level for opening under-sluices+52·92 gave a discharge of over 1,000 cusecs down the Vadavar.

The flow required at a duty of 50 for the direct supply of the area under the Vadavar 62,000 acres is 1,240 cusecs and thus with the shutters fully down the maximum discharge of the Vadavar is insufficient for the direct supply of the area under it.

If the flow of water could be continuosly maintained at this level the deficit would not be large, but this is not the state of the case. Even under existing circumstances with the enjoyment of the whole of the freshes and floods of the river and with the resulting seepage in the intervals between freshes, it is common in bad years for water to fall below the top of the shutters. Under the conditions of a reservoir on the Upper Cauvery impounding, as it would, almost all freshes in a bad year, it will be quite impossible to maintain anything approaching to present supplies to the Vadavar. It is clear that under conditions put forward by Mysore, Veeranam tank will hardly ever receive river water for impounding in a bad year while the direct supply water will be available far less frequently than at present. The present conditions of supply of the tank and system prior to 1899 have been greatly improved at very great cost by the Government of Madras ; but this Government do not wish to make a claim for floods which would under the conditions existing prior to 1899—1902 have been necessary, and to which, in strict law, their prescriptive right extends. They insist, however, that the fullest recognition and consideration should be given to the changes, and to the concessions made, as well as to the changes which the altered conditions of supply to the Coleroon will entail on the incidence of flow and supply, and further that the concessions made as regards floods should not be taken to indicate that floods under present conditions would be useless and their withdrawal would not very materially diminish useful supply.

96. The capacity of the Veeranam tank is small and its ayacut large. The tank holds about twelve days' full supply for its whole ayacut. It is of the nature of a "balancing reservoir" as correctly stated by Mysore.

Reference-Mysore paragraph 75.

As a "balancing reservoir" its *role* is to impound when there is water available in excess of daily requirements and to give out from the impounded supply when the reverse is the case, to make up any deficit.

As deficit in supply is of very frequent occurrence, the Veeranam tank is a work of the greatest value—indeed, one without which the irrigation under the Vadavar would fail with great frequency.

The statement is made by Mysore that, in certain years—for instance 1893-94, 1894-95, 1906-1907 and 1907-1908—the irrigation under the tank did not suffer. The fact that the area paying assessment under a work is not reduced is no proof whatever of absence of loss. The loss on an eight-anna yield as compared with one of sixteen annas is surely very great; but on an eight-anna or even four-anna yield no remissions are given. To entitle to remission, total loss of crop is necessary.

It is denied therefore that there was no loss in the years cited by Mysore.

Again, the fact that a tank does not fill is no proof that it has not fulfilled a very important *role*. A tank ceases to be useful only when it is empty; Marikanave reservoir in Mysore has never yet filled, but this does not mean it is in any way useless. A tank may be balancing supplies all the time although it never actually surpluses and this indeed connotes the condition of most useful employment. In the year 1893 the tank was empty in the first week of September. In 1894 the tank was empty in the third week of August. In 1906 the tank got no water till the 15th July, after which date it was never empty. In 1907 the

tank got no water till the middle of July. After that it was never empty. None of these cases connote absence of useful work by the tank.

In any case, the fact of a tank-supply having been very unsatisfactory in certain years, is not a reason for reducing those supplies and it is an irrefutable fact that Madras has a right to all useful supplies for this tank which she has hitherto enjoyed. The fact that in certain years supplies were not received is no reason for reduction of facilities for supply for the future.

It is denied that Mysore have shown that in certain years the crops under Veeranam tank did not suffer. It is denied that in any year the tank did not fulfil a useful *role*, and it is further denied that even if this were so, there is any reason for reducing the supplies and rights to supplies such as have passed into the tank in the past.

Reference-Mysore paragraph 76.

97. Mysore has misunderstood the statement in Madras, Part II, paragraph 38 (Ma. 8), which refers to the conditions prior to remodelling and also to conditions on the supposition that no supplies or assistance is received from the tank catchment, and it may be added from the Coleroon catchment (about 1,100 square miles) between the Upper and Lower Anicuts. The instances cited are years after remodelling when the conditions were altogether different. It is not denied that the tank receives from its catchment very material supplies, but it is affirmed and claimed that such supplies require supplementing and especially in June to August. In addition to taking years which are not applicable to the Madras statement, Mysore have drawn a wrong inference from the table which is that Madras have stated that it required 107 days to fill Veeranam tank in addition to supplying the ayacut with any flow at the Upper Anicut *exceeding 7·6 feet.*

This is not so. It was with a flow *not exceeding 7·6* feet which was alluded to and under the conditions which existed prior to the remodelling of the Upper and Lower Anicuts and prior to the construction of the Cauvery-Vennar regulators.

The inferences drawn by Mysore assume a wrong basis, assume years which are inapplicable and draw unjustifiable inferences from these faulty assumptions.

Reference-Mysore paragraph 77.

98. In the second remodelling of the Lower Anicut the cills were lowered to facilitate the passing of floods and to reduce risk from floods to the Lower Anicut which is a work that has breached badly twice and gives great cause for anxiety in high floods. This change has no doubt to a very slight degree reduced the percentage of flood water which can be passed into the Veeranam tank. The reduction is small while the condition of the work as regards utilization of floods as well as ordinary flow and minor freshes is improved very greatly by the remodelling of 1899-1900. The conditions of supply of the Veeranam tank under existing circumstances with the cills as remodelled, is, on the whole, satisfactory, although in a bad year inadequate supplies are received. In years of high flood the supplies are usually ample. It is in the years of low and infrequent fresh, that deficiency is experienced.

Under existing circumstances all floods in excess of 30,000 cusecs are passed down to the Lower Anicut and feed the Vadavar and no "special allowance" is necessary for feeding the Vadavar other than those provided in existing rules.

Under conditions greatly limiting, and in bad years almost entirely stopping, floods and freshes passed to the Lower Anicut, it is obviously necessary to give specific and special allowance to replace these.

In alternative, the strict legal right of Madras to floods hitherto enjoyed must be pressed for.

Reference-Mysore paragraph 78.

99. *Use of hot weather flow.*—It is denied that there is no hot weather irrigation in the Madras portion of the Cauvery at present. There is a large area of perennial and late irrigation under the Cauvery channels between Bhavani bridge and the Upper Anicut and water under these channels is needed all the year round. Special establishments are maintained for making of "Korambus" for diverting the river water into the channel heads. All the natural flow of the river during the hot weather is utilized for irrigation above the Upper Anicut.

Madras do not claim 900 cusecs as prescriptive right in the months of February to May. The Government of Madras' prescriptive right in these months extends to the whole natural flow of the river under the conditions existing prior to the installation of power and this right is now admitted by Mysore.

The Madras Government have not waived their claim to the hot weather flow without reservation. They waived it on the understanding that the water which under the working conditions set out in the Mysore Project is required for power, *viz.*, a continuous flow of 1,000 cusecs, will be passed down to Madras. They were prepared to allow a small working margin and accept a minimum of 900 cusecs. It is understood that the Durbar admits that the Madras Government are entitled to the whole of the natural flow of the river in the months of February to May subject to the customary draw-off for Mysore existing irrigation. Should Mysore after reasonable notice, discontinue the supply of 900 cusecs, the Madras' existing rights to the whole natural flow must be recognised as unimpaired.

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Appendix XV.

Statement showing the area of irrigation under the Cauvery and its tributaries above the Upper Anicut for each period of five years commencing from 1890.

Main river	Tributary	Area irrigated in acres					Remarks
		1890	1895	1900	1905	1910	
Tirumanimuthar ...	.....	* 3,011	6,069	6,324	5,244	6,506	
Omalur river or Sarabanganadi.	.....	† 3,801	5,467	5,113	3,453	6,164	
hoppiyar river ...	.....	1	1	1	3	3	
anathkumaranadhi ...	.....	233	240	229	232	243	
	Total ...	7,046	11,777	11,667	8,932	12,916	
Bhavani	Thadapalli channel including Ananthasagaram tank, Arkankottai and Kalingarayan channels.	29,264	29,446	30,087	30,412	31,085	
Do	.....	1,922	2,115	2,362	2,376	2,605	
	Total ...	31,186	31,561	32,449	32,788	33,690	
Noyil river (total) ...	.....	15,515	14,554	15,733	15,437	15,883	
Amaravati river ...	22 channels	† 17,091	26,068	26,066	25,889	26,441	
Do	4 channels	2,777	2,521	2,526	2,528	2,568	
Do	Nanganjiyar	604	669	922	682	1,035	
Do	Shunmuganadi ...	5,054	5,064	6,099	5,926	6,177	The area under the Palar has been included under the Shunmuganadi.
Do	Poranthalar	971	940	967	981	970	
Do	Pachiyar	1,689	1,674	1,385	1,446	1,609	
Do	Nallatangayar... ...	254	269	263	256	270	
Do	Varattar	2,161	2,064	1,686	1,524	2,157	
Do	Odai flowing into Varattar	106	131	111	91	122	
Do	Varattar flowing into Kodevanar.	14	14	87	39	149	
Do	Santhanavardhani ...	228	265	376	305	571	
Do	Odai flowing into Kodavanar.	28	103	122	127	139	
Do	Odai flowing into Santhanavardhani.	278	277	341	442	395	
Do	Kodavanar	2,210	2,696	2,708	2,751	2,949	
Do	Sirumalai Odai flowing into Santhanavardhani.	38	39	90	51	87	
Do	Sittar	76	101	122	110	116	
Do	Karumalai Odai ...	19	41	20	16	15	
Do	Kuthirayar	787	788	799	790	799	
	Total ...	34,385	43,724	44,690	43,954	46,569	
Cauvery river	Pogalore channel ...	...	2,250	2,226	2,285	2,317	Figures are not available for these channels for 1890.
Do	Vangal channel ...	...	1,048	1,046	1,046	1,035	
Do	Nerur channel ...	1,651	1,722	1,651	1,683	1,613	
Do	Krishnarayapuram channel	1,462	1,385	1,549	1,663	1,646	
Do	Mahadanapuram channel	718	633	640	643	646	
Do	Marudur Nattu voikal ...	5,742	5,833	5,795	5,928	5,928	
Do	Nangam voikal ...	2,222	2,132	2,191	2,171	2,220	
Do	Raja channel	2,965	2,975	2,963	2,921	2,920	
Do	Mohanur channel ..	1,282	1,272	1,281	1,336	1,535	
Do	Komarapalayam channel.	1,005	1,004	1,006	1,000	991	
Do	Ayilur channel ...	633	588	587	1,491	1,491	
Do	Siplaputhur channel ...	633	588	587	1,491	1,491	
Do	Tottiyam Chinna channel	2,124	2,996	3,183	3,308	3,428	
Do	Tottiyam Periya channel	1,792	2,795	2,938	2,973	3,085	
Do	Srinivasanallur channel ...	827	1,269	1,496	1,485	1,587	
Do	Musiri voikal	2,477	2,644	2,547	2,554	2,652	
Do	Amur voikal	839	811	811	819	830	
Do	Konaselem voikal ...	737	738	624	621	625	
Do	Uyyakondan channel ...	23,948	24,745	25,000	25,112	25,458	
Do	Ramavathalai channel ...	1,328	1,379	1,392	1,386	1,475	
Do	Peruvalai channel ...	14,654	14,973	15,086	15,250	15,357	
Do	Panguni channel ...	6,648	6,673	6,629	6,524	6,489	
Do	Ayyan channel ...	14,495	14,164	14,738	14,756	14,714	
Do	Baling	20	31	28	25	32	
	Total ...	88,202	94,978	95,994	98,477	99,565	

* Information is not available for certain channels. The area under Ponnayar has been included under Tirumanimuthar.

† Figures not available for certain channels.

Appendix XV—*contd.*

ABSTRACT.

Statement showing the area of irrigation under the tributaries of the Cauvery down to Upper Anicut.

Name of rivers	Tributary	Area irrigated in 1890	Area irrigated in 1895	Area irrigated in 1900	Area irrigated in 1905	Area irrigated in 1910
		Acs.	Acs.	Acs.	Acs.	Acs.
Tirumanimuthar and minor streams	.....	7,016	11,777	11,667	8,932	12,916
Bhavani	.....	31,186	31,561	32,449	32,788	33,690
Noyil	.....	15,515	14,554	15,733	15,437	15,883
Amaravati	.....	34,385	43,724	44,690	43,954	46,569
Cauvery	.....	88,202	94,978	95,994	98,477	99,565
	Grand Total ...	176,334	196,594	200,533	199,588	208,623

Appendix XVI.

Demi-official.—From the Hon'ble Mr. H. E. Clerk, Joint Secretary to Government, Public Works Department, Irrigation Branch.

To—Sir J. Benton, K.C.I.E., Inspector-General of Irrigation.

Dated—The 18th September 1911.

No.—441-1/11.

With regard to the Mysore Cauvery Reservoir Project and Mr. Gordon's letter No. 9751, dated 28th August 1911, this Government have now written to Mysore suggesting a reservoir of limited size for power alone and have sent a copy to the Government of India which no doubt will be sent to you.

I write now to point out that there is one slight inaccuracy in your note dated 28th July 1911.

While dealing with Mr. Larminie's statement that 6 feet was the recognized gauge at the Upper Anikat, you in paragraph 4 (iii) of your note state that both the anikat crest and gauge referred to by Mr. Larminie have been lowered 4 feet.

The anikat crest has been lowered, but the gauge to which Mr. Larminie referred was the Cauvery Dam gauge which, I believe, has never been altered.

I have looked up the original papers and find that Mr. Larminie was dealing with the relative advantages of reservoirs on the Bhavani and Cauvery, and when he spoke of the recognized level, he was considering the level required at the accepted duties with continuous supply. His argument tended to prove that it would be unsafe to reduce the water level below 6 feet. The question of the necessity of keeping it above that level with an unsteady supply was not considered by him.

I explained this to Mr. Visvesvaraya when he was with me.

The question is not a very important one and I have not alluded to it in the letter to Mysore or the Government of India, but I write this in case you may wish to modify your note.

Appendix XVII.

Comparative statement of annual discharges of the Cauvery and Vennar in millions of cubic feet—June to January.

Years	From Administration reports, Madras	From Sir J. Benton's Note of 12th May 1911, Appendix V, column 10 (Ma. 8—a.)
	CUBIC FEET.	CUBIC FEET.
1890—91	173,924	129,078
1891—92	173,099	128,398
1892—93	191,351	143,184
1893—94	248,099	179,123
1894—95	177,753	125,501
1895—96	227,533	164,095
1896—97	294,062	227,560
1897—98	287,470	205,990
1898—99	229,441	173,508
1899—00	121,452	117,312
1900—01	326,624	229,671
1901—02	268,428	204,624
1902—03	213,002	173,109
1903—04	276,179	223,146
1904—05	184,046	128,933
1905—06	185,635	165.265
1906—07	200,006	185,701
1907—08	234,830	236,777
1908—09	204,330	177,068 †
1909—10	295,434	252,337 †

* From discharges recorded in water registers.

† This figure omits second crop period—*vide* Sir J. Benton's Appendix V.

4

Appendix XVIII.

TABLE showing occasions of carrying water in Cauvery and Vennar at depths exceeding full supply stated in the rules of regulation in force.

The Cauvery.

Year and month	Total number of days, when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days, extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1900.								
June	4	...	2	1	1	4	...	4
July	31	2	10	4	15	31	1	30
August	28	3	...	3	19	24	3	21
September	14	3	6	2	2	14	...	14
October	6	...	3	...	3	6	...	6
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	83	8	21	10	40	79	4	75
1901.								
June	3	1	1	...	1	3	...	3
July	20	1	11	2	3	17	1	16
August	13	2	9	...	...	11	...	11
September	4	...	...	1	1	2	...	2
October	19	1	1	3	2	7	...	7
November	10	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	69	5	22	6	7	40	1	39

Note.—One day noted in column 8 for July 1900 is the 13th.
Three days noted in column 8 for August 1900 are—7th, 14th and 15th.
One day noted in column 8 for July 1901 is the 14th.

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days, extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1900.											
June	7	...	...	2	...	5	...	...	7	.....	7
July	31	...	...	...	...	16	4	11	31	.....	31
August	31	1	...	1	...	1	3	26	31	.....	31
September	20	2	1	1	2	8	3	...	16	.....	16
October	13	...	2	1	1	7	...	...	13	.....	13
November	1	...	...	...	...	1	...	...	1	.....	1
December	...	...	...	...	...	...	...	...	...	.....	...
Total ...	103	3	3	5	3	38	10	37	99	.....	99
1901.											
June	7	...	1	1	...	5	...	...	7	.....	7
July	22	...	1	...	...	15	3	3	22	.....	22
August	26	2	1	1	...	22	...	...	26	.....	26
September	4	1	...	...	2	...	...	...	3	.....	3
October	21	...	1	1	...	5	2	...	9	.....	9
November	12	...	...	...	...	...	...	...	.	.....	...
December	...	...	...	...	...	...	...	...	...	.....	...
Total ...	92	3	4	3	2	47	5	3	67	.....	67

Appendix XVIII—*contd.*

Table showing occasions of carrying water in Cauvery and Vennar at depths exceeding full supply stated in the rules of regulation in force—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1902.								
June	...	...	...	...	...	...	...	...
July	17	1	2	4	6	13	2	11
August	2	1	1	...	...	2	...	2
September	18	2	4	4	2	12	...	12
October	14	...	...	1	2	3	...	3
November	11	...	...	...	...	...	...	...
December	14	...	...	...	...	...	...	...
Total ...	76	4	7	9	10	30	2	28
1903.								
June	..	...	...	...	...	...	...	...
July	16	...	...	1	15	16	...	16
August	30	...	9	2	7	18	2	16
September	24	...	...	...	...	...	...	...
October	24	2	10	2	...	14	...	14
November	15	1	5	1	2	9	2	7
December	12	...	...	...	...	...	...	...
Total ...	121	3	24	6	24	57	4	53

Note—Two days noted in column 8 for July 1902 are 18th and 19th.
Two days noted in column 8 for August 1903 are 3rd and 4th.
Two days noted in column 8 for November 1903 are 14th and 16th.

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1902.											
June	1	...	...	...	...	1	...	...	1	...	1
July	21	1	1	1	1	12	4	...	20	...	20
August	7	1	1	...	1	4	...	...	7	...	7
September	17	...	...	1	2	5	1	...	9	...	9
October	10	1	1	1	...	...	..	...	3	...	3
November	1	...	...	..	...	...	...	...	...	...	...
December	9	...	...	...	...	...	...	...	...	...	...
Total ...	66	3	3	3	4	22	5	...	40	...	10
1903.											
June	...	...	...	..	...	...	...	...	...	Nil	Nil
July	16	...	1	...	...	4	7	4	16	...	16
August	16	...	4	...	...	1	1	2	8	...	8
September	8	...	...	...	...	...	...	...	...	...	Nil
October	14	...	...	...	...	...	...	...	...	...	...
November	12	...	1	...	...	...	...	...	1	...	1
December	12	...	...	...	...	...	...	...	...	...	...
Total ...	78	...	6	...	...	5	8	6	25	...	25

Appendix XVIII—*contd.*

Table showing occasions of carrying water in Cauvery and Vennar at depths exceeding full supply stated in the rules of regulation in force—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, column 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1904.								
June	12	2	4	...	...	6	...	6
July	29	3	7	8	6	24	...	24
August	14	2	2	3	...	7	...	7
September	5	...	4	1	...	5	...	5
October	4	2	1	...	...	3	...	3
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	64	9	18	12	6	45	...	45
1905.								
June	1	1	...	...	...	1	...	1
July	18	...	5	1	1	7	...	7
August	7	...	6	...	1	7	...	7
September	6	1	...	...	...	1	...	1
October	9	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	41	2	11	1	2	16	...	16

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, column 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1904.											
June	13	1	2	...	...	...	...	...	3	...	3
July	23	...	4	3	1	...	...	...	8	...	8
August	14	...	1	...	...	5	...	...	6	...	6
September	2	...	1	1	...	...	...	...	2	...	2
October	1	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...
Total ...	53	1	8	4	1	5	...	...	19	...	19
1905.											
June	...	...	...	...	...	...	...	...	...	...	...
July	17	...	1	...	...	...	...	...	1	...	1
August	4	...	...	...	1	1	...	...	2	...	2
September	9	...	...	...	...	...	...	...	...	...	...
October	8	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...
Total ...	38	...	1	...	1	1	...	...	3	...	3

Appendix XVIII—*contd.*

Tables showing occasions of carrying water in Cauvery and Vennar at depths exceeding full supply stated in the rules of regulation in force—*contd.*

The Cauvery.

Year and month	Total number of days, when passing over was 4·5 practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, column 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1906.								
June	...	...	...	...	...	...	...	...
July	8	4	...	...	...	4	...	4
August	17	1	2	...	...	3	...	3
September	6	...	...	...	...	...	...	...
October	10	2	3	2	...	7	...	7
November	2	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	43	7	5	2	...	14	...	14
1907.								
June	1	...	...	...	...	...	...	...
July	5	...	3	1	1	5	...	5
August	5	...	2	4	20	26	...	26
September	6	...	...	...	...	...	...	...
October	9	...	...	...	...	...	...	...
November	2	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	28	...	5	5	21	31	...	31

The Vennar.

Year and month	Total number of days, when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried On account of flood conditions	Number of days extra water carried for irrigation only, column 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1906.											
June	...	...	...	...	...	...	...	...	...	...	...
July	10	...	1	5	1	...	...	...	7	...	7
August	24	...	1	1	...	4	...	...	6	...	6
September	5	...	...	...	...	...	...	...	...	...	...
October	14	...	...	...	...	...	...	...	...	...	...
November	5	...	...	...	...	...	...	...	...	...	...
December	2	...	...	...	...	...	...	...	...	...	...
Total ...	60	...	2	6	1	4	...	...	13	...	13
1907.											
June	3	...	...	...	...	...	...	...	...	...	...
July	10	...	...	1	...	1	...	2	4	...	4
August	31	...	...	1	1	12	...	12	26	...	26
September	7	...	...	...	...	...	...	...	...	...	...
October	9	...	...	...	...	...	...	...	...	...	...
November	6	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...
Total ...	66	...	...	2	1	13	...	14	30	...	30

Appendix XVIII—*concld.*

Table showing occasions of carrying water in Cauvery and Vennar at depths exceeding full supply stated in the rules of regulation in force - *concld.*

The Cauvery.

Year and month	Total number of days when passing over 4·5 was practicable	Number of days readings realised within limits					Total number of days extra water carried on account of flood condition	Number of days extra water carried for irrigation only columns 7—8
		4·6 to 4·9	5·0 to 5·4	5·5 to 5·9	6 feet and over	Total over 4·5		
1	2	3	4	5	6	7	8	9
1908.								
June	...	...	...	...	...	...	...	14
July	19	5	9	...	...	14	...	17
August...	17	4	13	...	...	17	...	...
September	6	...	...	...	...	...	...	...
October	3	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...
Total ...	45	9	22	...	...	31	...	31

The Vennar.

Year and mont	Total number of days when passing over 7 feet was practicable	Number of days carried							Total over 7 feet	Total number of days extra water carried on account of flood conditions	Number of days extra water carried for irrigation only, columns 10—11
		7·1 to 7·2	7·3 to 7·4	7·5 to 7·6	7·7 to 7·8	7·9 to 8·0	8·1 to 8·4	8·5 and over			
1	2	3	4	5	6	7	8	9	10	11	12
1908.											
June	...	...	...	...	...	...	...	...	...	...	...
July	16	...	...	...	...	...	...	...	...	...	...
August...	15	...	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...	...	...
October	2	...	...	...	...	...	...	...	...	...	...
November	3	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...
Total ...	36	...	...	...	...	...	...	...	...	...	...

Exhibit Ma. 13.

REJOINDER OF MADRAS.

PART VII.—FACTS AND ENGINEERING ARGUMENTS—THIRD ISSUE.

1. The three alternatives suggested during this arbitration as systems of measurement, did not, until now, mention measurement at Sivasamudram. A system of measurement of the inflow into Kannambadi Reservoir and of estimating the quantity of water due to Madras on a system of proportions of this flow to the whole flow at the Upper Anicut has, however, been mentioned. This system is briefly described in Part IV, paragraph 8 (Ma. 10), under the designation of "the third system." This is not mentioned among the systems considered in Mysore paragraph 80.

Reference-Mysore paragraph 80.

2. It is agreed that a system of measurement at Sivasamudram need not be further considered.

Reference-Mysore paragraph 81.

3. The Madras system involves measurement of the inflow into the reservoir and in addition the measurement of the flow of the Kabbini which is the only really consistently reliable tributary of the Cauvery, except the Bhavani, between Kannambadi and the Upper Anicut.

Reference-Mysore paragraph 82.

A percentage must be applied to the limit flow due to Madras to cover any proved liability to loss in transmission and this percentage to be fixed tentatively pending accurate calibration of the gauge above the main anicut at Sivasamudram. This system has been fully described and it is advanced as the one which will best, subject to fixing a suitable percentage, ensure to Madras full protection of their existing rights as regards both quantity, and incidence of flow, while allowing Mysore to impound to the extent, but only to the extent, which is consistent with such a condition.

4. The matter of gain and loss in transmission between Sivasamudram and the Upper Anicut should not be treated as a matter of conjecture. Had Mysore discharges at Sivasamudram been reliable, a statement showing discharges at each end of the transmission line would now be available and a figure suitable to cover liability to such losses could be fixed.

Reference-Mysore paragraph 83.

As the discharges are unreliable, a tentative figure based on the best available data can be fixed to cover it, pending the accurate calibration of Sivasamudram gauge, when a permanent percentage can be settled. The recent observations at Danakere Anicut fully confirmed the contention that there is liability to continuous losses in transmission for considerable continuous periods. Appendix X (Ma. 10) gives details of these losses and shows that they were continuous and material throughout a period of three weeks and totalled to a loss of 14·4 per cent. for the whole three weeks.

5. The contribution of flow of the Cauvery tributaries excepting the Bhavani during periods of deficient rainfall is so small as not nearly to cover losses in transmission between Sivasamudram and the Upper Anicut. In a similar season the inflow of the Bhavani is insufficient to supply the draw-off of the Cauvery channels above the Upper Anicut. The net result is that, during bad seasons, or parts of a season, it is quite common for the flow at the Upper Anicut to be less than the flow at Sivasamudram for days together, and the gaugings taken this year at Danakere establish this on fairly conclusive evidence.

Reference-Mysore paragraph 84.

It is not suggested that there is not very frequently a gain in transmission and any such representation would be absurd, but it is advanced that Madras irrigation must be protected from abstraction of water to which there exists prescriptive right during the periods in which loss in transmission occurs. The admission made by Madras as regards the north-east monsoon contribution of the Madras catchment is with reference to good years only—(*vide* Ma. 8, Part II, paragraph 5).

Reference-Mysore paragraph 85.

6. The Mysore system of measurement is objected to by Madras on the ground that it does not provide for the maintenance unimpaired of the flow of water to which Madras has rights, either as regards quantity, or incidence of flow, while the system is complicated and difficult of practical application (*vide* Part IV, paragraphs 72 to 74, Ma. 10).

Reference-Mysore paragraph 86.

7. The occasional independent check of the discharges at the Cauvery Dam is probably desirable. The gauging of discharges at the Cauvery and Vennar is fully as complicated a matter as at the Cauvery Dam. The Vennar regulator is generally discharging with shutters lifted clear or with a very small afflux, and the liability to error of results calculated from sluice discharge formulæ would be large.

Reference-Mysore paragraph 88.

8. Madras views on the subject of tentative findings have been given in Part IV, paragraph 78 (Ma. 10).

Reference-Mysore paragraph 89.

9. What is required to be known under the system of regulation put forward by Madras is the loss in transmission from all causes including inflow and draw-off for irrigation as well as absorption. What is required in the case of the system advanced by Mysore is the loss in transmission due to evaporation and absorption only. Both aspects of the matter have been considered separately in the Madras case and definite, although tentative, percentages advanced. The loss in transmission including all inflow, draw-off, evaporation and absorption is treated of in Part IV, paragraphs 43 to 56 (Ma. 10). Losses in transmission by evaporation and absorption only are dealt with in paragraphs 57 to 62.

There has been no mixing up of the two different cases as stated by Mysore in paragraph 89.

10. The observations at Danakere fully prove liability to losses in transmission under both headings for continuous periods of days and even weeks. Further observations will be valuable and are called for, but unless they prove gross error in the already observed discharges, they cannot possibly disprove the above.

11. There is no suggestion that, on an average of long periods, there is a net loss in transmission; but a gain at one period cannot compensate Madras for deprivation at another, and it is necessary that Madras rights as regards limit flow shall be fully safeguarded and remain *unimpaired*.

12. As regards time of transmission, it has been pointed out in the Madras case that there is no such thing as exact time of transmission.

The statement of Mysore that all that is required is accurate discharges plotted on diagrams to give an easy determination of this is not concurred in.

Madras has, however, no objection to time of transmission being made the subject of further examination and fixed only tentatively if this factor becomes relevant.

Reference-Mysore paragraphs 90 and 91.

13. Subject to the definite fixing of the system of regulation and the methods on which the final figures are to be arrived at when accurate calibration of the Cauvery at Sivasamudram gauge is made and the results of necessary observations are available, the Government of Madras agree that the undernoted items may be fixed tentatively, the method of computing permanent figures when accepted discharges are available being indicated in the findings of the Arbitrator.

The items are—

(*a*) The "proportion factor" to be applied to the inflow at Kannambadi Reservoir in the south-west and north-east monsoons, respectively.

As regards this, the "proportion" referred to does not indicate the relation the total flow at Kannambadi bears to that at the Cauvery Dam in these seasons, but refers to the proportion factor to be fixed for insertion in the rules with a view to safeguarding Madras rights.

(*b*) The percentage, if any, to be allowed for transmission losses.

(*c*) The interval of time necessary to allow as the time of transmission or flow from Kannambadi to the Cauvery Dam.

14. The reference to items (*d*) and (*e*) of paragraph 91 of the Mysore reply (My. 8) is not understood since no figures representing these find place in any system of rules or measurement suggested.

The items are included in the results of the figures representing items (*a*) and (*b*).

It is noted that Mysore agree that the system of measurement and the rules themselves should now be finally fixed and with them the methods of applying the corrected record of discharges when available in the matter of revision of the tentative figures.

Reference-Mysore paragraph 92.

15. The Mysore revision of "Madras Table N", which showed the result of working the system of measurement as then put forward by Mysore, is claimed by Mysore to show that most of the admitted defects of the Mysore system can be eliminated.

The resulting figures in Mysore "Madras Table N improved" show the same defects as those to which Madras made objections but in a less aggravated form.

It is stated that this alteration in results is due to the omission of consideration in the Madras tables of loss in transmission. The examination of the Mysore "Improved Table N" reveals that another material alteration has been made in preparing these "improved tables." That is, that in computing compensation water due to Madras (column 6), an omission has been made in excluding from consideration all *minus* figures in column 5.

The result is the deprivation of return to Madras of water due to the amount of these figures. This at once explains why the figures of this "Improved Table N" show results more favourable to Mysore and appear to show results also more favourable to Madras.

In addition to the figures shown in the tables, further compensation water was due to Madras totalling to 3,194 million cubic feet, which represents additional water wrongfully impounded by Mysore to the detriment of Madras.

It is under these conditions that the "Improved Table N" shows more favourable results than the original Madras table.

The table is incorrectly worked out and the inferences drawn from the erroneous results are also erroneous. As, however, Mysore have abandoned the rules and materially modified the system of working on which this table was drawn, no useful purpose will be served by drawing up a corrected table or by further examination of rules which by their abandonment are presumably admitted even by Mysore to display the defects to which objection was taken by Madras.

Reference-Mysore paragraphs 93 and 94.

16. The rights and also the necessities of Madras demand that all natural flow of the river up to the limit flow to which they are entitled shall not be reduced on any day on which, under existing conditions, that flow would have been available. Under these conditions, allowances to cover liabilities of loss in transmission are absolutely necessary to protect and safeguard such rights.

The fact that there is frequently a gain in transmission does not safeguard Madras from loss on the days on which the reverse happens. It may be added that the losses occur most frequently in the bad years or bad months when water is specially required, and deprivation entails losses much greater than is represented by the actual amount of water withheld, considered on the basis of average value of water. Allowance for gains as a "set off" against losses in transmission involves taking water away when it is specially scarce and valuable; because at times when it is plentiful more than is required can be given. Any such "set off" is surely

a gross deprivation and infringement of Madras rights and cannot be said, to quote the words of the second term of reference, to " conserve these rights unimpaired." The Madras system, subject to a suitable percentage, or, in alternative, the third system, subject also to a fixing of a suitable *proportion factor*, provides for conservation unimpaired of Madras rights.

17. It is shown below that the system of measurement at the Upper Anicut altogether fails to effect this and such a system cannot fully safeguard Madras prescriptive rights.

18. Mysore have admitted the intention to extend direct irrigation above the Kannambadi Reservoir by about 20,000 acres and, as explained in the Madras case, this extension above the limit of area of wet lands to be submerged by the reservoir as well as any further extensions can only be made with the help of the reservoir by feeding from the reservoir existing wet lands lying below that work with water drawn from the impounded store, while supplying the new area above with the " direct flow " which previously was required to supply the existing irrigation below. This is a feasible and ingenious way of extension and the idea is altogether due to Mysore, not to Madras, and the description of the same has been derived from official Mysore letters and reports.

Reference-Mysore paragraphs 95 and 96.

It is from these reports that it is ascertained that all suggestions for extension of irrigation under the upper channels were negatived because of the necessities of existing Mysore areas below.

The Mysore reports and correspondence on the subject of the proposed extensions show that the proposed extensions have been refused sanction on the ground of deficient natural direct flow and are now only sanctioned because the existing areas under the lower channels can be adequately supplied from the reservoir.

The irrigation period referred to by Madras is from October to January and does not embrace the period of year in which the requirements of power entail restricted issue of water to irrigation and the suggestion that the extensions have been postponed only on account of power is denied; but, even if this were so, it is immaterial and does not affect the main considerations, *viz.*, that the extensions are only possible by means of the reservoir and will, unless taken into account, result in reducing Madras supplies.

Up to the middle of January the discharge of the Kabbini alone is generally sufficient for power and the special restrictions to conserve water for power have only been necessary after the 15th January and only affect perennial and late crop irrigation. The extensions proposed are extensions of areas irrigated during the main irrigation season—June to December.

19. In this connection an article, extracted from the *Madras Mail*, of 19th May 1913, is reprinted as Appendix XX. Enquiries have elicited that the writer of this article had no knowledge whatever of the matter treated of other than that extracted from the official reports, letters, and written statements of the Mysore Government or its officers and that the whole of the matter forming the article is derived from such sources.

It has further transpired that the official documents on which the article is based were, through oversight, or otherwise unintentionally, placed at the disposal of the press and have, since the publication of the article, been withdrawn.

It appears, however, quite certain that the Government of Mysore have declined, previous to the sanction of the reservoir scheme, to carry out the extensions of irrigation on these channels; but that they now propose to do so in view of the protection which the reservoir will afford to the supplies of the existing lower channels.

20. The article states: "The Government also point out that, although these projects have been ready for some years and their construction has been repeatedly urged by the Representative Assembly, they could not be sanctioned as the water-supply was uncertain. The Cauvery Reservoir will now, however, protect all the irrigated area below it and the extension of the upper channels can therefore be carried out without risk of detriment to the irrigation in the lower reaches."

It is perfectly clear that this information is extracted from official reports either of the Durbar or some of its officers. Madras claim that such extensions of irrigation as are contemplated above the reservoir in excess of the wet area to be submerged are and should be treated as new irrigation dependent on the reservoir.

It is submitted that the reports, estimates and all other documents referring to the proposed extensions and to the scheme for re-establishing on the land the cultivators displaced by the submergence caused by the new reservoir, may be produced for the perusal of the Arbitration Committee.

The Government of Madras claim that any extensions of irrigation on the Cauvery or its tributaries above the reservoir in excess of the area of existing irrigation submerged by the reservoir, shall, in considering the water due to Madras, be treated in the same way as extensions of irrigation below the reservoir.

21. The contention put forward by Mysore amounts to claiming a right for the purpose of extending their irrigation to all water falling in the Cauvery basin above the Upper Anicut in excess of that producing the " limit flow " at the Upper Anicut and at once places an obstacle on all further extensions by Madras in the valley of the Cauvery. While Madras do not deny the justice of the contention on the assumption that the full limit of the Madras prescriptive right according to the strictest interpretation of the law is conceded, the claim is objected to on the ground that Madras are not claiming their full legal prescriptive right in view that under the circumstances this would be unduly onerous on Mysore.

Reference-Mysore paragraph 97.

The claim of Mysore now put forward is only reasonable on the assumption that the strict legal rights of Madras are considered and provided for, not only at the Upper Anicut, but on all the main tributaries of the Cauvery separately considered.

The strict legal rights of Madras at the Upper Anicut as stated by Madras with reference to the Upper Anicut (Part III, paragraphs 44, Ma. 9) extend to all natural flow and floods in the Cauvery at all times when the Veeranam tank does not contain 916 million cubic feet and to a limit flow of 2,944 million cubic feet per day at all other times.

22. The Government of Madras have proposed to relinquish their right to floods, although required to fully secure their existing rights and contributing greatly to the supplies of the Coleroon system, but in view of the onerous nature of the claim now made by Mysore to limit all extensions by deducting water for these from the limit flow allowed as Madras prescriptive rights, the Government of Madras formally withdraw this proposal and ask for the recognition of their full legal right to floods. The concession made in not claiming floods subject to certain allowances must be withdrawn in the face of this new claim of Mysore, which is only reasonable if the full legal right of Madras to the water at the Upper Anicut and on each tributary stream is recognised. If such rights are made the subject of investigation and recorded, adjudication thereon will involve a great extension of the scope of the whole enquiry, while computation of the effect of extensions of irrigation which may be carried out in the future in Madras would be so complicated as to defy any solution on the basis of reasonably exact computation.

23. For instance, let it be considered how a reservoir on the Bhavani or the Noyel would affect the working of the complicated Mysore system of measurement at the Upper Anicut, and it will be realised at once that one is faced by a problem so complicated as to be incapable of solution by any process of computation not open to question. This claim introduces another and very grave objection to the system of measurement at the Upper Anicut which is put forward by Mysore, as under this system nothing in the shape of a final settlement can be contemplated. The system proposed by Madras, or "the third system," is open only in a very minor degree to these objections, while the effects of alteration of the existing conditions can be computed without great difficulty. The Mysore system is one which promises to involve constant differences between the two interested States and a constant condition of suspicion and unrest.

The Madras system, or any system of measurement in Mysore, contains the element of finality which is so desirable and also leaves both States as far as is practicable free to develop their own resources.

Mode of measurement proposed by Mysore.

24. This paragraph does not quite correctly interpret Colonel Ellis' note which showed that the proportion 0·6 suggested for trial by the Asseessor in application to the third system of regulation did not suffice to safeguard Madras interests.

Reference-Mysore paragraph 99.

Colonel Ellis suggested that trial of a proporation of 0·8 in the south-west monsoon and 0·5 in the north-east monsoon might be made the subject of computation but did not propose or suggest adoption of these. The trials and computations were not originated by Madras, but were made under the directions of the Assessor as arranged by the Arbitration Committee.

25. The issue to be decided is: "what principles and rules can best be formulated which will ensure to Madras full protection of their prescriptive rights?" The first consideration is the full protection of the existing and immense interests of Madras. If those interests are in any way adversely affected by the Mysore project, then Madras is justified in refusing assent to the project. It is not a case for compromise. The case is not one where both Governments are proposing new projects and where a settlement on the basis of give and take might therefore be reasonable. The interests of Madras involve an existing and huge liability both to the cultivators and a directly dependent population of over two million people, and also to an independent Sovereign State (France). The interests of Mysore are relatively small and are only prospective. They must clearly be subordinated to the much larger and existing interests of Madras and the French possessions. The terms of the third issue clearly recognise this.

Reference-Mysore paragraph 100.

26. There is no possible system of regulation which can prevent loss of water into the sea, and this has been emphasised in Sir J. Benton's notes (Ma. 8-a, G. O. No. 296 I. of 18th September 1911). The Government of Madras considered that the system proposed by them is the most suitable, but do not object to the third system subject to the fixing of proportions which will fully protect them.

Reference-Mysore paragraphs 101 and 102.

Table I drawn by Mysore is erroneous in omitting consideration of *minus* figures of column 6; but, even with this, it clearly shows that a proportion of 0·6 will not in the south-west monsoon protect Madras rights.

This has already been shown in Col. Ellis' tables.

In the Mysore new system referred to below, 0·625 has been taken as the factor for the south-west monsoon in their new rules of regulation. It is believed that the proportion 0·8 and 0·5 suggested by Col. Ellis might suffice to protect Madras as regards both quantity and incidence of flow. It is such protection which is the essence of Madras claims and the primary consideration to be held in view in deciding on a system of regulation.

27. The Government of Madras accept and agree with the statement of Mysore that the Mysore proposals are subject to the condition *of not interfering with Madras prescriptive rights in any way* and subject to this have never denied to Mysore the right of impounding. No system of regulation advanced by Mysore has, however, satisfied this condition. It is not clear in what respect table II is material to the case as it only displays results derived from an examination of a system and conditions of a regulation which is not advanced by Mysore for acceptance or consideration. No remarks are therefore made on table II except that it does not display conditions of working which, either as regards quantity or incidence of flow, protect Madras rights, even assuming that the limit quantities useful at the Cauvery Dam put forward by Mysore were correct.

Reference-Mysore paragraph103.

28. In these paragraphs, Mysore refer to a revised system of regulation now for the first time advanced and which, although not altogether clearly described, can be understood from a study of tables III with the help of the explanations—pages 69 and 70 (Appendix P).

Reference-Mysore paragraphs 104 and 105.

The system is a compound of the original "Mysore system" of measurement at the Upper Anicut and of issue of compensation water from their reservoir and

the "third system" of forecasting the flow at the Upper Anicut by applying a proportion factor to the measured inflow into the Kannambadi Reservoir.

29. In applying this system, Mysore recognises that the proportions—

0·625 for the south-west monsoon,

0·33 for the north-east monsoon,

which are proposed in the new rules now put forward, will not fully safeguard the rights of Madras and proposes to retain the system of issue of compensation water to make up the deficiency of flow passed down whenever such deficiency occurs.

30. The working of the system is examined by Mysore in tables III for the year 1905-06 and for part of the current year 1913.

Tables III display the same omission as is shown in "Improved table N" in the matter of the *minus* figures in column 5.

Such omission constitutes, obviously depriving Madras of water to which she has prescriptive right, and the rectification of the omission displays the Mysore system in a materially worse aspect as regards its effect on both quantity and incidence of flow, than the Mysore tables (or the diagrams representing them) display.

Revised tables III-A (Appendix XIX) have been drawn showing the results given by applying the necessary corrections to the figures in Mysore tables III for the years 1905-06 and 1913. Similar tables have been drawn for the early months of the years 1899 and 1902.

31. The results obtained are shown in tables III-A (Appendix XIX), and also displayed in diagrams which are produced. For the purpose of comparison with Mysore tables, all these tables have been made on the same basis, *viz.*, on the basis of the maximum useful supplies allowed under Mysore rules, but this is only done to enable comparison to be made on some basis which cannot be disputed by the other side and which admit of comparison and is not to be taken as implying any admission.

Analysing the results of the tables, it will be seen—

In 1905-06.—The incidence of useful flow produced under the impounding shows a diagram much more serrated, that is, a much more fluctuating supply, than the natural flow afforded.

That the quantities of irrigation supplies are deficient to the following extent (column 9 of the tables) :—

					M.C.FT.
June	...	...	...	...	2,619
July	...	...	...	...	2,384
August	...	...	...	...	876
September	...	...	...	...	577
			Total deficient supply	...	5,456

This is a much larger amount than made out by Mysore and represents water enough to irrigate some 28,000 acres.

Even on Mysore figures, which are wrong, a deficient supply of 3,477 million cubic feet is admitted and this represents an area of over 17,000 acres. Their diagram also shows a materially more fluctuating incidence of discharge than the natural flow.

The Madras figures show the same results, but the deficiency and the fluctuations produced by the application of the system are in these tables greater.

It is submitted that Madras tables are correct computations.

Both sets of tables display conditions which do not bear out the Mysore claims that the system leaves Madras protected both as regards quantity and incidence of flow, but distinctly shows that full protection is not given as regards either of these.

Again consider the year 1899, the worst, of which we have full records.

Here the diagram shows the incidence of flow is greatly affected to the detriment of Madras in the second half of June and again in the first half of July and in the middle of August.

As regards quantities, deficient irrigation supplies are passed as under—

	M.C.FT.
June	3,241
July	2,479
August	1,719
	7,439

Such a deprivation in such a year would have meant great disaster, as it was the year which was one of very great deficiency. The deficiency connotes a supply sufficient for irrigating about 37,000 acres.

It will be noted that the diagram shows that in this year almost all the water passed by Mysore for compensation is surplused to waste.

In the year 1902.—The incidence of flow is much more irregular than natural flow and the fluctuations are to the detriment of Madras in the third week in June, the second week in July and the third week in July. The latter two cases would have been very unfavourable to Madras irrigation.

The deficient supplies of this year are—

	M.C.FT.
June	1,101
July	3,776
	4,877

and represents some 25,000 acres.

32. As regards the tables and the diagram for 1913, the infringement on Madras rights displayed in this year is smaller than in any of the others examined, but it cannot be said even for this year that, either as regards incidence or quantity of flow, it shows unimpaired preservation of the rights of Madras.

Reference-Mysore paragraph 106.

33. For the reasons given and on the evidence of tables and diagrams, it is altogether denied that the claim made by Mysore is in any way substantiated so far as regards Madras; that claim is that the system leaves "both quantity and incidence of flow undisturbed."

Reference-Mysore paragraph 107.

The tables and diagrams clearly prove that the application of the rules gives a precisely different result and affects Madras interests prejudicially both as regards quantity, and incidence, of flow.

34. The system is no doubt an improvement on the first proposals in that it partially incorporates the system of measurement in Mysore which has always been advocated by Madras as essential. Just in so far as this principle is brought in, the system promises success and just so far as the practice of passing compensation water is necessary, the system fails in working.

With "proportion factors" increased so as to reduce the amount of compensation water, the interference with incidence of flow and the surplusing of compensation water, would be reduced. That is, the nearer the system approaches one based only on measurement in Mysore, the more fully will it be likely to prove efficient as well as simple in application.

35. In conclusion, it is advanced that the revised rules advanced by Mysore as Appendix E, Part II (My. 7), are rather of the nature of explanation of tables III to which they freely refer.

Reference-Mysore revised rules, Appendix E (revised).

The rules Nos. 8 and 9 involve operations having no object or effect when taken in connection with the rest of the rules.

In no case can Madras assent to the impounding by Mysore of the whole flow of the Cauvery during the month of February as provided for in these rules, and, as regards impounding, the whole flow from March to May only on certain conditions elsewhere specified.

Appendix XX.

Extract from the "Madras Mail," dated 19th May 1913.

THE CAUVERY RESERVOIR.

The ambitious project of the Mysore Government for damming the Cauvery river at Kannambadi, eight miles above the island of Seringapatam, thereby creating a huge reservoir, the water of which will be used for irrigation purposes and for the supply of power for the generation of electricity, reached a practical stage some considerable time ago, and has now been taken a step further by the completion of a scheme, which has been published by the Mysore Government, for carrying out the difficult and delicate negotiations connected with the acquisition of the land which will eventually form the projected reservoir. The construction of this Cauvery Reservoir involves the submersion of about 5,000 acres of wet land and 4,656 acres of dry land, situated in forty-eight villages, of which eight villages will be more or less completely submerged, and will also render necessary the displacement of a population of about 5,000 souls. The task of acquiring these lands by the payment of compensation and of re-settling the population displaced has proved a problem which the Mysore Government have finally solved, after long and anxious consideration. The magnitude of the work has given rise to peculiar difficulties and His Highness the Maharaja's Government are to be congratulated on the scheme they have devised, which, while it safeguards the interest of the local agriculturists, will enable the authorities to acquire the necessary land at the minimum financial outlay.

The mere acquisition proceedings do not present any extraodinary difficulties, for competent machinery already exists for this work, but should they be carried out in the customary way, and monetary compensation be handed over to the owners of the area acquired, the displaced population would be unable, if left to themselves, to obtain other land for cultivation and would not, on account of their numbers, have any opportunity of resettling as agriculturists in the same neighbourhood. The authorities wish to avoid the hardships that have been caused to the people in similar operations in other parts of the country, where it has been found that, if the Government content themselves with paying compensation in money to the owners of land and neglect to ensure their resettlement, the result is, almost invariably, finally to reduce them to the condition of day labourers. To prevent this, the aim of the present project is to provide the displaced raiyats with lands in exchange for those taken from them, supplemented, where necessary, by monetary compensation. In most cases it would be necessary to provide this land from the area which will eventually be irrigated by the new reservoir, but the Mysore Government have, luckily, in the immediate neighbourhood, facilities for carrying out three channel extension projects, which will be taken advantage of for the present project, and which will, it is estimated, provide irrigation for an area large enough for the purpose required.

These projects are the Alalkatte, Hemagiri and Mandagiri channel schemes, which were prepared some years ago and which are estimated to cost about Rs. 25 lakhs. It will be a substantial addition to the cost of the acquisition if they are to be carried out as well, but the compensating advantages are so great that the Government have decided that they shall be undertaken. The estimated cost of acquiring the Cauvery Reservoir area was put down in the sanctioned estimate at Rs. 10 lakhs, a sum which will probably be largely exceeded. If land compensation is attempted, it is estimated that the Government may have to spend about Rs. 13 lakhs more, but this additional Rs. 13 lakhs will enable the Government to carry out three important channel extensions and will be a remunerative outlay in itself. The Government also point out that, although these projects have been ready for some years, and their construction has been repeatedly urged by the Representative Assembly, they could not be sanctioned, as the water-supply was uncertain. The

Cauvery Reservoir will now, however, protect all the irrigated area below it, and the extension of the upper channels can therefore be carried out without risk of detriment to irrigation in the lower reaches. After the most careful consideration, the Government have come to the conclusion that, if worked with proper safeguards, the proposal to give land in exchange for that to be acquired will prove more economical than monetary compensation from the point of view of the Mysore State, and by adopting it they will be consulting the permanent interests of the displaced population. They have, accordingly, adopted the scheme.